MINING WORLD

YERINGTON

First Report On Anaconda's Newest Copper Mine and Plant

EIMCO

FAST LOADING IN DRAWPOINTS with an Eimco Model 21 RockerShovel will save time and increase production. Mining companies switching to mechanical loading in production have reported as much as 50% increase per man shift.

THE EIMCO CORPORATION
Salt Lake City, Utah, U.S.A.
Export Office: Eimco Bldg., 52 South St., New York City

JULY, 1954

Vol. 16 No. 8

35 cents a copy
in sterling 3s

THE ANACONDA COPPER COMPANY *is using the Traylor Bulldog for primary reduction in its open pit mine at Yerington, Nevada. The Traylor Bulldog Gyratory was specified for this important installation because of Anaconda's past experience with Traylor machines.*

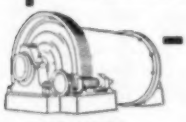
BIG 25 TON DIESEL TRUCKS *dump run of pit ore onto a*

Traylor Bulld
controls t
of this big open

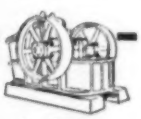
Primary Gyratory Crushers

Rotary Kilns

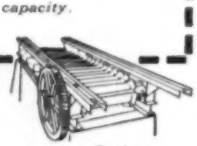
Secondary Gyratory Crushers



Ball Mills



Jaw Crushers



Apron Feeders

WA
PAG

Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P.Q.

Sure I'm interested in the huge production of a Traylor Bulldog Gyratory. Let's have more facts.

Name _____

Company _____

Address _____

I'm now operating a _____ *crusher*

with _____ *tons daily capacity.*

Announcing

THE NEW

AVY

GES

DW15 TRACTOR

answer to important earthmoving needs!

can
sep

ard
mal
yds.

per load at these speeds. It can maneuver in tight cut, fill or haul road situations.

Do you need a wheeled tractor with power and exceptional lugging ability?

The DW15 is your answer! Its new 150-HP diesel engine is matched to its weight and capacity. Its heavy-duty clutch and transmission match the engine. Engine, clutch and transmission are designed and built by one manufacturer.

Do you need a unit that will produce all day without exhausting operators?

The DW15 is your answer! The hydraulic booster makes steering easy . . . only eight pounds of steering effort are needed. Air-boosted flywheel clutch, constant-mesh transmission, large-capacity air brakes, anti-jackknife protection and a comfortable bucket-type seat with hydraulic snubber provide the operator with safe, easy operation.

Do you need a tractor that will give you a profitable day's production, day in and day out?

The DW15 is your answer! Designed and built by Caterpillar, it is available with a complete line of matched units . . . scrapers, bottom dump and side dump wagons.

Call your Caterpillar Dealer today. He'll give you complete details on this new high-production, high-speed earthmoving machine. He'll show you the DW15 in action.

Caterpillar Tractor Co., San Leandro, Cal.; Peoria, Ill., U. S. A.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

THE ANACONDA COPPER COMPANY *is using the Traylor Bulldog for primary reduction in its open pit mine at Yerington, Nevada. The Traylor Bulldog Gyratory was specified for this important installation because of Anaconda's past experience with Traylor machines.*

BIG 25 TON DIESEL TRUCKS *dump run of pit ore onto a stationary grizzley with 4" openings. Oversize is fed directly into the Traylor Bulldog Gyratory. Its daily production is over 11,000 tons of copper-oxide ore.*

Traylor Bulldog Gyratory controls the output of this big open pit copper mine

The Bulldog Gyratory operating at Anaconda's Yerington mine is equipped with Traylor's original curved concaves and bell head. This is the Traylor feature that mine operators throughout the world have come to depend upon for continous, economical crusher operation in their most important installations. If your plant's daily production is governed by the capacity of its primary breaker, come to Traylor where crushers are "Traylor-Made" to make money for you.

A **Traylor** LEADS TO GREATER PROFITS

MAIL COUPON FOR BULLETIN

TRAYLOR ENGINEERING & MANUFACTURING CO.
663 MILL ST., ALLENTOWN, PA.
Sales Offices: New York • Chicago • San Francisco
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P.Q.

Sure I'm interested in the huge production of a Traylor Bulldog Gyratory. Let's have more facts.

Name _____

Company _____

Address _____

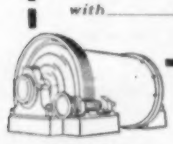
I'm now operating a _____ *crusher*

with _____ *tons daily capacity.*

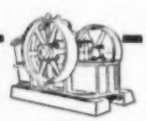
Primary Gyratory Crushers

Rotary Kilns

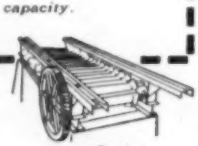
Secondary Gyratory Crushers



Ball Mills



Jaw Crushers



Apron Feeders

Announcing

THE NEW

150-HP CAT* DW15 TRACTOR

the answer to important earthmoving needs!

Do you need a fast, four-wheel tractor that can work effectively in narrow, confined areas, yet keep pace with larger units?

The DW15 is your answer! It has ten forward speeds up to 24 m.p.h. . . . up to 31.3 m.p.h. with optional gears. With matching scraper, it carries up to 15 cu. yds. per load at these speeds. It can maneuver in tight cut, fill or haul road situations.

Do you need a wheeled tractor with power and exceptional lugging ability?

The DW15 is your answer! Its new 150-HP diesel engine is matched to its weight and capacity. Its heavy-duty clutch and transmission match the engine. Engine, clutch and transmission are designed and built by one manufacturer.

Do you need a unit that will produce all day without exhausting operators?

The DW15 is your answer! The hydraulic booster makes steering easy . . . only eight pounds of steering effort are needed. Air-boosted flywheel clutch, constant-mesh transmission, large-capacity air brakes, anti-jackknife protection and a comfortable bucket-type seat with hydraulic snubber provide the operator with safe, easy operation.

Do you need a tractor that will give you a profitable day's production, day in and day out?

The DW15 is your answer! Designed and built by Caterpillar, it is available with a complete line of matched units . . . scrapers, bottom dump and side dump wagons.

Call your Caterpillar Dealer today. He'll give you complete details on this new high-production, high-speed earthmoving machine. He'll show you the DW15 in action.

Caterpillar Tractor Co., San Leandro, Cal.; Peoria, Ill., U. S. A.

CATERPILLAR*

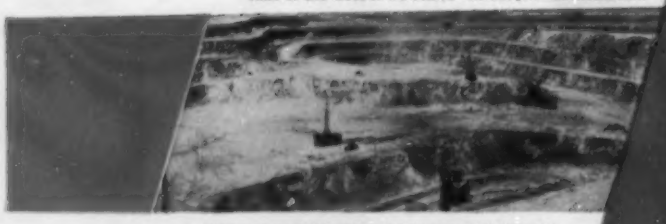
*Both Cat and Caterpillar are registered trademarks—(9)

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

30 DARTS

...on the job at Anaconda Copper Mining Company's Yerington, Nevada, Pit...

Nine of the fleet of 30 DARTS "on the job" at ANACONDA.



DART'S down-hill braking feature pays off in a pit like this. 13,000 tons of copper-oxide ore are mined here daily.

Two of the fleet of 25-ton, 20 cubic yard trucks used at Yerington.

The DARTS keep the shovels busy on the pit floor at Yerington.

A DART dumping on the low-grade ore stockpile.

High Production... Low Maintenance

The Model 140 DARTS powered by 300 H.P. Diesels, are providing Anaconda's Yerington operation with high production haulage with low maintenance . . .

In an operation like this, where service has to be continuous, the built-in quality and greater stamina of DART TRUCKS is shown.

DARTS waiting to be loaded with waste from the leaching vats.

DART BUILDS HEAVY DUTY MINING TRUCKS FROM 10-TON TO 75-TON CAPACITIES . . . ENGINEERED TO MEET YOUR SPECIFIC REQUIREMENTS . . . FOR COMPLETE INFORMATION WRITE:

DART TONNAGE ENGINEERED TRUCKS

Kansas City 6, Missouri

SUBSIDIARY OF THE CARLISLE CORPORATION

CABLE: "DARTRUCO"

GRAB SAMPLES From the Mail

Can I Purchase Bore Hole Camera?

Dear Sir:

Can you tell us whether the "N. X." Bore Hole Camera featured in your March 1954 issue is available for sale? If not, can a similar model be obtained?

M. T. D. Copper (Sales) Limited
London Wall
England

So great has been the interest in the new bore hole camera described in the article "Would You Like To See The Inside Of A Bore Hole?" that Robert H. Nesbitt, assistant chief, Geology and Geophysics Branch, Office of the Chief of Army Engineers, who has had a significant part in the development of the camera has the following to say in regard to sales and use of the camera.—Ed.

"The March 1954 issue of *Systems* magazine published by Remington Rand, Inc. contains a general description of the construction and operation of the pilot model of the camera and projector, together with an historical background of the development. Information pertaining to cost and sales is omitted intentionally, inasmuch as it is felt that these items raise questions which should be answered by the builder of the camera.

"After devoting two years, intermittently, to using and testing the first camera in foundation borings for high dams, and having explored its use in the field of mining, I am inclined to take the view that because of the experience required for its effective use, cylindrical bore hole photography will be available as a special service by private industry, supplementary to core borings, before cameras and projectors go into large-scale production.

"The respect which we have developed for the camera, as both an indispensable geological instrument and a money-saving device, is reflected in our decision to require bore hole photography of critical borings as a matter of routine foundation investigations for all high dams. The first camera has paid for itself by faithfully photographing on color film complete lengths of 3-inch-diameter borings which served to reduce very considerably the number of extremely expensive 36-inch borings and shafts required to investigate a rock fault below one of our dams. Its next assignment is to determine the effectiveness of foundation grouting (cementation) at another large dam."

Oronite Sells D-40

Dear Sir:

In the January 1954 issue of MINING WORLD, page 40, D-40 is mentioned as a detergent for the flotation of scheelite at the Getchell Mine, Inc. I would be thankful to know who sells this reagent.

Hans Frederick Winsnes
Ulefoss, Norway

D-40 is sold by the Oronite Chemical Division of the Standard Oil Company of California. It increases the emulsification of fatty acid promoters—Ed.

MINING WORLD

Including the Export Edition **WORLD MINING**

Published monthly except in April when publication is semi-monthly

VOLUME 16 — **JULY 1954** — **NUMBER 8**

SAMPLE LOCATIONS

MINING WORLD

	Page
Drifts and Crosscuts	41
Capitol Concentrates	43
Yerington—Anaconda's Latest Contribution to Copper Metallurgy	45
Anaconda Men Who Made Yerington	46
Early Exploration Delimits Orebody; Deep Drilling Continues	48
Anaconda Builds Weed Heights—Nevada's Most Modern Town	65
How Leviathan Mine Overcomes Sulphur Shortage	66
High Power Factor and Preventive Maintenance Cut Costs	68
Activities of U. S. Mining Men	71
Metal and Mineral Prices	90
Index of Advertisers	108

WORLD MINING

How Anaconda Planned Truck Pit	49
Selective Mining Using Rotary Blast Hole Drilling	50
Three Stage Crushing in Gyratory and Cones	53
Agglomeration Proves Key to Low Cost Circulation Leaching	56
How Precipitation Yields Coarse Copper Particles	59
Sulphuric Acid Plant First to Use Low Grade Ore	61
Activities of International Mining Men	73
Fission Facts	75
International News	77
Production Equipment Preview	88

COVER CIRCLE: The famed Anaconda copper arrow is symbolic of copper leadership "from mine to consumer." It is symbolic of Anaconda Copper Mining Company's Yerington project described for the first time in the technical press in this issue.

PUBLISHING OFFICE

Emmett St. — **Bristol, Conn.**

EDITORIAL AND EXECUTIVE OFFICES

121 Second St. — **San Francisco 5, Calif.** — **GArfield 1-5887**

General Manager, San Francisco **M. F. HOLSINGER**
Editor ..... **GEORGE O. ARGALL, JR.**
Field Editor ..... **MARVIN A. HUSTAD**
Field Editor ..... **STANLEY DAYTON**
News Editor ..... **J. M. TAYLOR**
Assistant News Editor ..... **G. J. WOLFE**
Product Editor ..... **B. A. McCURRY**
District Manager, Chicago ... **KAREL WEGKAMP**
District Manager, New York .... **A. E. ROBERTS**
Production Manager ..... **J. A. CHEESMAN**
Assoc. Editor, Vancouver .... **CHARLES L. SHAW**

Branch Offices

New York 17 . 370 Lex. Ave., Murray Hill 3-9295
Chicago 26 .. 1791 Howard, Rogers Park 4-3420
Vancouver, B. C. ..... 906 Royal Bank Bldg., MArine 7287

Published by

American Trade Journals, Inc.
Miller Freeman, President
L. K. Smith, Vice-President
W. B. Freeman, Vice-President
Miller Freeman, Jr., Sec.-Treas.

STAFF CORRESPONDENTS IN THE FOLLOWING CITIES AND MINING CENTERS:

Africa: Accra, Gold Coast; Costermansville, Belgian Congo; Johannesburg, Union of South Africa; and Kitwe, Northern Rhodesia. **Asia:** Ankara, Turkey; Benares, India; Kuala Lumpur, Federated Malay States; and Tokyo, Japan. **Europe:** Frankfurt, West Germany; Helsinki, Finland; London, England; Madrid, Spain; Paris, France; Redruth, Cornwall; Rome, Italy; Stockholm, Sweden; The Hague, Netherlands; and Trondheim, Norway. **North and Central America:** Mexico City, Mexico; San Jose, Costa Rica; and Vancouver, British Columbia. **Oceania:** Port Kembla, (N.S.W.) Australia. **South America:** Bernal, Argentina; La Paz, Bolivia; Lima, Peru; Quito, Ecuador; and Sao Paulo, Brazil.

Not responsible for unsolicited manuscripts.

ABC — **A MILLER FREEMAN PUBLICATION** — ABP

Copyright 1954 by American Trade Journals Inc.

Contents may not be reproduced without permission

Mining World Subscription Rates

U. S. North, South and Central America	**$3.00**
Other Countries	**$4.00**
Single Copies	**$ .35**
Directory Number	**$2.00**

WORLD MINING is published the 26th of each month as a regular department of MINING WORLD and is also circulated as a separate publication on a carefully controlled free basis to a selected list of management and supervisory personnel associated with active mining enterprises throughout the world.

MINING WORLD, July, 1954. Volume 16, No. 8. Published monthly, except April when publication is semi-monthly, at Emmett St., Bristol, Conn. Executive, advertising and editorial offices, 121 Second St., San Francisco 5, California. Subscription in United States, North, Central and South America, $3.00 per year; other countries, $4.00 per year. Entered as second class matter Oct. 10, 1951 at the Post Office at Bristol, Conn., under the Act of March 3, 1879. Postmaster: please send notice 3579 to MINING WORLD, 121 Second St., San Francisco 5, Calif.

OPEN-PIT

MIDDLEWEIGHT CHAMPION *Self-propelled, rotary blast hole drill. 6¼" holes to 50'. For all formations where rotary drilling is practical.*

HEAVYWEIGHT CHAMPION *Self-propelled, rotary blast hole drill. Drills 7⅞" hole to 200' in any formation where rotary cone-type bits are applicable.*

MODEL 225 *Truck-mounted rotary which produces holes to 6¼", 150' deep. Similar but smaller model is 875 which drills a 4½" hole 50' deep.*

CHALLENGER *A self-propelled hammer drill that produces a 4½" hole to 50'. Very maneuverable.*

MEDIUMWEIGHT WAGON DRILL *Holes to 3" diameter in any formation. Depth to 24'.*

DRILLING ?

Look to JOY for the RIGHT Drill

Want an *unbiased* opinion on the best type of drill for your job? Then consult a Joy Engineer. You see, only Joy produces a complete line of *both* rotary and pneumatic drills. Therefore, only Joy is able to recommend and supply exactly the type and size of drill to best do your job.

Formation and hardness of the rock dictates the type of drill to be used. Sometimes a rotary is best, sometimes a pneumatic. Often a combination of both will give the best results. But, be safe, check with an authority who has no "axe to grind" for one type or another—your Joy Engineer.

SELECT-O-DRILL TABLE

Average Depth of Hole	Max. Diameter of Hole	Application	Model Class or Type
15′	2½″	Percussion drill for hard or soft rock—where one-man operation is desirable.	Lightweight Wagon Drill
24′	3″	Percussion drill for all formations where drilling angles vary from vertical to above horizontal.	Mediumweight Wagon Drill
50′	4½″	Percussion drill for blast holes in all formations—fast moving, fast setup.	T-500 Challenger
50′	4¾″	Truck-mounted rotaries for fast moving between holes. For blast hole drilling with drag or rotary cone-type bits in all except hard formations.	No. 75 Drill Rig
150′	6¼″		No. 225 Drill Rig
50′	6¼″	Self-propelled rotary blast hole drills for all formations where rotary cone-type bits are applicable.	Middleweight Champion
200′	7⅞″		Heavyweight Champion

JOY MANUFACTURING COMPANY
Oliver Building Pittsburgh 22, Pa.
In Canada: Joy Manufacturing Company (Canada) Ltd., Galt, Ontario

JOY

SINCE 1851—OVER A HUNDRED YEARS OF ENGINEERING LEADERSHIP

Another

outstanding mining operation depends on a

DINGS RECTANGULAR SUSPENDED MAGNET

for Positive Tramp Iron Protection

. . . AT ANACONDA'S WEED HEIGHTS, NEVADA PROJECT

• In large scale mining operations such as Anaconda Copper Mining Company's project at Weed Heights, Nevada, you'll find positive tramp iron protection being provided by big, powerful Dings Rectangular Suspended Magnets . . . installed above belts or chutes.

These Dings RM Magnets are the most efficient tramp iron magnets manufactured. They will stop tramp iron on jobs where magnetic pulleys, old style rectangular magnets or circular magnets fail.

Here, then, is real protection for your crushers, screens and other equipment. Find out about Dings RM Suspended Magnets now. *Send for Catalog.*

DINGS MAGNETIC SEPARATOR CO.
4719 W. Electric Ave., Milwaukee 46, Wis.

Dings

MAIL THIS COUPON NOW

DINGS MAGNETIC SEPARATOR CO.
4719 W. Electric Ave., Milwaukee 46, Wis.

Please send literature describing Dings Rectangular Magnets for mining service.

Your Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

RM254

Take a look at SILICA SAND

Galigher Beneficiation

GALIGHER PRODUCTS

Agitair Flotation Machines . . . Commercial and Laboratory Agitair . . . Laboratory Ball Mills . . . Geary-Jennings Samplers . . . Geary Reagent Feeder . . . Laboratory Pressure Filters . . . Acid-Proof Sump Pumps . . . VacSeal Pumps.

The two strips above are enlarged photographs of silica sand with natural impurities and the same sand after beneficiation in the Galigher laboratory. The flow sheet required for this particular sand provides the economical procedure for a premium optical glass. Some other non-metallic problems that have been successfully solved by Galigher metallurgists are as follows: Barite, Fluorspar, Vanadium, Columbium, Tantalum, Coal and Coal Sludges, Graphite, Phosphate, Spodumene, Feldspar, Sulphur, Rare Earth, Mica, Cement Rock. Galigher metallurgists, with experience and technical knowledge gained through more than 1200 different mineral dressing problems of world wide scope, are qualified to custom design a flowsheet for your problem. Galigher services in addition to flowsheet development, include detailed plant design and construction.

For authoritative information that applies to any special problem in this field, feel free to write us.

HOME OFFICE
545 West 8th South
Salt Lake City, Utah
P. O. Box 209

EASTERN OFFICE
921 Bergen Avenue
Jersey City, New Jersey

Agents In All Principal Foreign Mining Districts

THE GALIGHER CO.

METALLURGICAL DIVISION · THE GALIGHER COMPANY · ENGINEERING SERVICE

CONSULTATION • ORE TESTING
PLANT DESIGN • GEOLOGIC INVESTIGATION

SUPERIOR Gyratory CRUSHERS

29 in 3 YEARS!

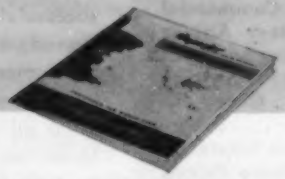
SUPERIOR primary and secondary gyratory crushers have been making a big name for themselves since they were introduced three years ago. Twenty-six are installed and operating... three are under construction now, including a huge 60 x 109 machine — largest crusher the world has ever known.

A policy of simplifying design and controlling quality has made Allis-Chalmers the leading builder of crushers. A continuing policy of *improving* crusher design has greatly extended this leadership.

This vast backlog of crusher application experience — over 75 years of it — is always available to you when you want to make sure of a successful installation. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4319

Superior is an Allis-Chalmers trademark.



NEW 32-Page Book Contains Helpful Crushing Data

- Packed with factual "how to" information on figuring hp requirements, impact and compressive strengths.
- Step-by-step procedures for estimating gyratory crusher sizes, capacities. Examples are worked out.
- Many other valuable facts on gyratory crusher operation . . . application . . . engineering.

It's a book you'll want to have and keep!

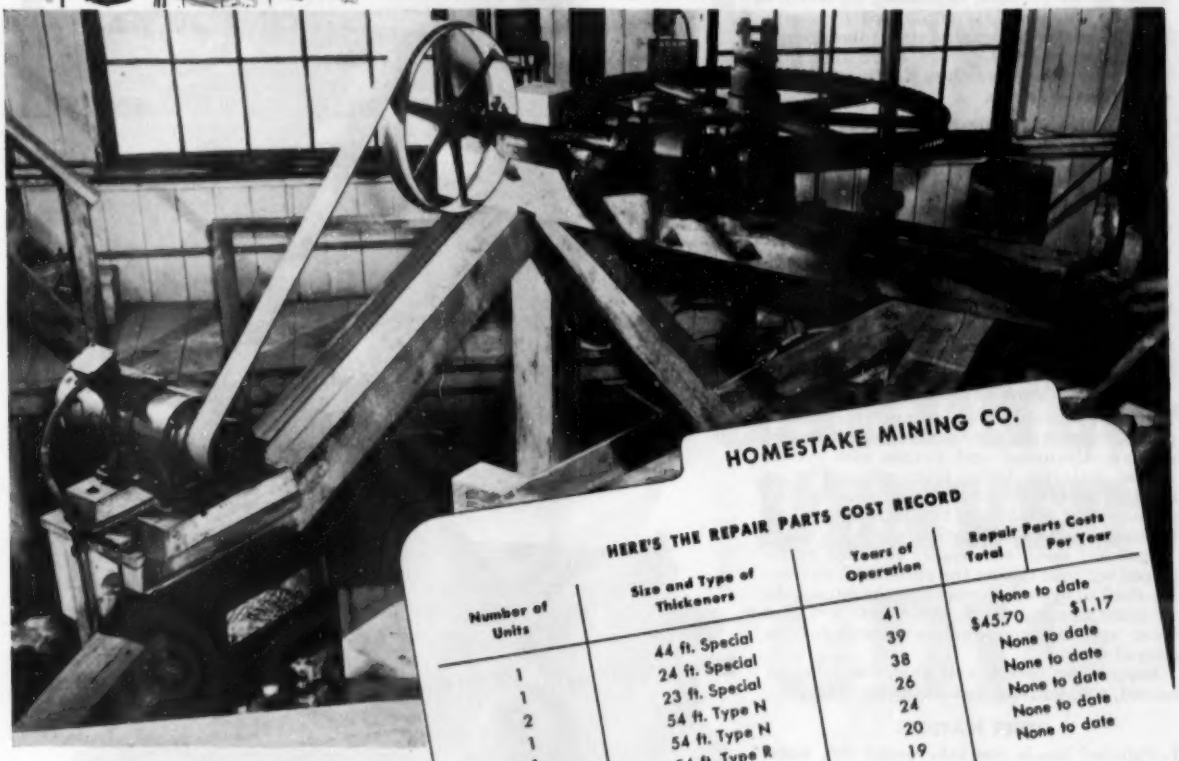
ALLIS-CHALMERS

A-C ALLIS-CHALMERS

Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.

AT HOMESTAKE MINING COMPANY

Eight Dorr Thickeners in slimes circuit average 21 cents per unit per year for repair parts cost.



Closeup of drive mechanism of one of the eight Dorr Thickeners in the Homestake slimes circuit. This particular 24' diameter unit has been operating since 1914.

HOMESTAKE MINING CO.

HERE'S THE REPAIR PARTS COST RECORD

Number of Units	Size and Type of Thickeners	Years of Operation	Repair Parts Costs Total	Repair Parts Costs Per Year
1	44 ft. Special	41	None to date	
1	24 ft. Special	39	$45.70	$1.17
2	23 ft. Special	38	None to date	
1	54 ft. Type N	26	None to date	
1	54 ft. Type N	24	None to date	
1	54 ft. Type R	20	None to date	
1	60 ft. Type R	19		

In the period 1911 to 1933, Homestake ordered eight Dorr unit-compartment Thickeners of varying types and sizes for slimes thickening. As shown in the table above, the maintenance record of these units is adequate testimony that they were built to last.

Light duty in the slimes circuit — sure. We'll also have to admit to remarkably careful and efficient operation on the part of Homestake over the years. But bear in mind that these are light machines — built for light duty — and are still going strong after 16 to 38 years of continuous operation.

We wouldn't suggest that you can expect "no repair" performance on every Dorr Thickener regardless of type of duty. Point is, though, when you buy Dorr you buy minimum repairs. More important still, you buy minimum shut-down time and maximum production. The Dorr Company, Stamford, Conn., or *in Canada*, The Dorr Company, 26 St. Clair Avenue East, Toronto 5.

Better tools TODAY to meet tomorrow's demand

DORR

WORLD - WIDE RESEARCH • ENGINEERING • EQUIPMENT

THE DORR COMPANY • ENGINEERS • STAMFORD, CONN.

Offices, Associated Companies or Representatives in principal cities of the world.

Why this feeder doesn't cave in

● The reason is simply this: *The* PIONEER-ORO *Feeder is the most rugged feeder ever built.*

Take a look at its massive pans . . . cast from a special wear-resistant manganese steel, heavily ribbed, reinforced, and all the way from 5/16" to 1" thick, depending on width of feeder. The pans are supported by heavy, closely-spaced manganese steel rollers, keyed 3 to a heavy diameter shaft. Each shaft turns in 3 heavy-duty bearings rigidly supported on the feeder frame.

Takes heaviest dump loads

The PIONEER-ORO is designed for the roughest, toughest feeding jobs on earth. It withstands the impact of the heaviest dump loads. It shrugs off abrasion from hard ores, slag, flintrock, granite, and other coarse, heavy materials.

But the mighty PIONEER-ORO offers more than sheer, brute strength. It is a smooth-running, finely engineered unit designed to deliver a constant flow of heavy, abrasive material, with a minimum of maintenance. Even preventive maintenance costs are low.

Rivetless pans overlap and interlock

Pans, for example, overlap and interlock to provide added stability and stop leakage and spilling. Upturned end flanges also reduce loss of material. Drive links are cast as an integral part of the pan, so there are *no bolts or rivets that can loosen.* Easily replaced link bushings need no lubrication.

Sprocket teeth are readily reversed or replaced without taking the sprocket hub from the shaft or even disconnecting the pans. Like all other wearing parts, these teeth are cast from special wear-resistant manganese alloyed steel.

Supporting rollers and shafts can be removed, too, without disturbing the pans.

OTHER FEATURES

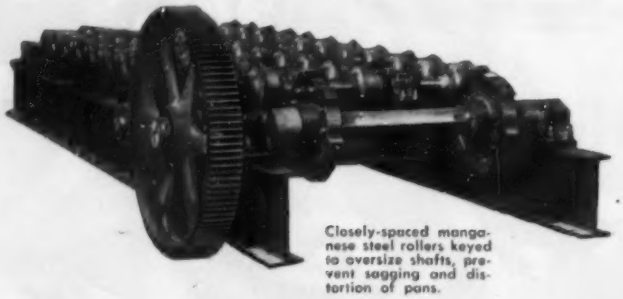
1. Patented lugs in pan links remove dirt, make links self-cleaning.
2. Feeder can be made to run in either forward or reverse direction.
3. Available in standard widths up to 84", widths in excess of 84" by special order, and lengths as required.
4. Made with 6", 9", 12" or 15" pan pitch (depending on width) to fit available head room.

PIONEER-ORO FEEDER
Capacities in tons per hour

Travel per Min.	Width of feeder						
	30"	36"	42"	48"	60"	72"	84"
10'	74	108	147	192	300	432	588
15'	112	162	222	289	450	648	888
20'	148	216	294	384	600	864	1176
25'	186	270	368	482	750	1080	1472
30'	223	324	442	577	900	1296	1768

Ask Your Feeder Salesman These Questions

1. Are pans made from special manganese steel? How thick?
2. Are pans and links cast together so they are rivetless?
3. Can manganese parts be replaced without disassembling pans?
4. Will pans support themselves without rollers?



Closely-spaced manganese steel rollers keyed to oversize shafts, prevent sagging and distortion of pans.

Note the turned-up end flanges and corrugated surface of heavy-interlocked pans; also absence of rivets.

For further details and specifications regarding full line of PIONEER *Feeders, write Pioneer Engineering Works, Inc., Minneapolis 13, Minn. (subsidiary of Poor & Company, Chicago) or see your nearest* PIONEER *Distributor.*

BUY BOTH! HIGHER OUTPUT LOWER UPKEEP

Pioneer *Continuflo* EQUIPMENT

Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn.
Subsidiary of Poor & Company • Chicago
Please send information on equipment checked.

- ☐ GRAVEL PLANTS
- ☐ WASHING PLANTS
- ☐ MECHANICAL FEEDERS
- ☐ ROCK PLANTS
- ☐ BITUMINOUS PLANTS
- ☐ VIBRATING SCREENS
- ☐ JAW CRUSHERS
- ☐ APRON FEEDERS
- ☐ BUZZER SCREENS (LIGHT DUTY)
- ☐ ROLL CRUSHERS
- ☐ ORO FEEDERS
- ☐ CONTINUFLO CONVEYORS

*Name*_____
*Company*_____
*Address*_____
*City*_____ *Zone*____ *State*_____

NOTHING LIKE IT

IN THE MINE CAR LOADER FIELD!

NEW GARDNER-DENVER GD10

NEW CONVENIENCE! Naturally positioned controls . . . quickly and easily moved to either side.

NEW SAFETY! Low center of gravity . . . high flange wheels . . . for greater stability on the rails.

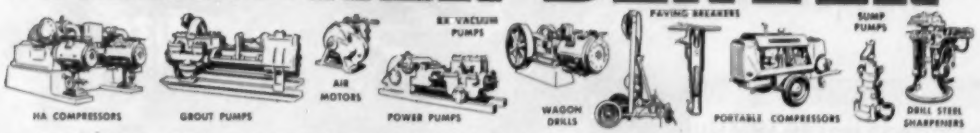
NEW CAPACITY! One-piece, large-capacity dipper . . . rounded bottom for self-cleaning.

NEW OILING ROUTINE! Only two points to check . . . both take the same commonly available oil.

NEW FEATURES BY THE DOZEN! Write for details.

SINCE 1859

GARDNER-DENVER



THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Export Division: 233 Broadway, New York 7, N.Y., U.S.A. **Gardner-Denver Company, Quincy, Illinois, U.S.A.**

George Wimpey & Company, Ltd. report:
"We purchased our first **LIMA** in 1947.
Today we rely on **50 LIMAS** in
United Kingdom, Aden, South Africa and Borneo"

LIMA Type 2400 equipped with grapple. This machine is one of seven Type 2400's owned by George Wimpey and Co., Ltd.

Large Lima excavators and cranes are standard equipment now for George Wimpey & Company, Ltd., one of the United Kingdom's largest civil engineering contractors. Ten Lima type 802's, thirty-three 1201's and seven 2400's are moving about 10,000,000 cubic yards yearly for Wimpey. Their diverse, world-wide operations include stripping overburden at open cast coal sites in the United Kingdom, harbor and refinery construction in Aden, dam building in South Africa and pile driving in Borneo.

After their first machine in 1947 proved very satisfactory, Messrs.

LIMA Type 2400 dragline working on a refinery project in Aden.

Three LIMA Machines working on harbor construction project in Aden.

LIMA Type 2400 dragline stripping overburden at open cast coal site in Northern England.

LIMA Type 802 stripping overburden at Ashton open cast coal site in United Kingdom.

Wimpey decided to standardize on Lima machines for all large excavators not made in the United Kingdom. This standardization has benefited them two ways:

1. Lima machines have given Wimpey the reliability and high output required for continuous, economical operation.
2. Uniformity and ready availability of replacement parts throughout the world, have avoided costly delays due to idle equipment.

It will pay you, too, to standardize on Lima for shovels, cranes and draglines.

BEFORE you buy any machine, be sure to **COMPARE** carefully all important features. **LIMA** offers you all of these:

1. Bronze bushings in tread, idler and drive rollers are protected by piston-ring type dirt seal rings and retainers.
2. All gears, smaller parts and shafts which are subject to extra wear are flame or induction hardened for longer life.
3. Main machinery is placed well back of center of rotation to eliminate excess counterweight.
4. Anti-friction bearings, used at all important bearing points, reduce destructive friction, fuel consumption and lubrication requirements.
5. Big capacity drums and sheaves lengthen cable life by reducing the need for double wrapping and sharp bends in cable.
6. Machine cut propel and swing gears and roller chain power take-off are enclosed in a sealed oil bath for dirt elimination and smoother, quieter operation.
7. Torque converter (optional) automatically adjusts speed to load requirements, minimizing shock loading, making performance smoother and faster. (Standard on Type 2400 shovel).
8. Full air controls on travel, hoist, swing and boom hoist, result in smoother, more precise operation, minimum maintenance and less operator fatigue.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

CABLE ADDRESS: LIMASHOVEL

LIMA

SHOVELS • CRANES
DRAGLINES • PULLSHOVELS

BALDWIN BLH LIMA-HAMILTON
Construction Equipment Division

BALDWIN-LIMA-HAMILTON CORPORATION
Construction Equipment Division
LIMA, OHIO, U.S.A.

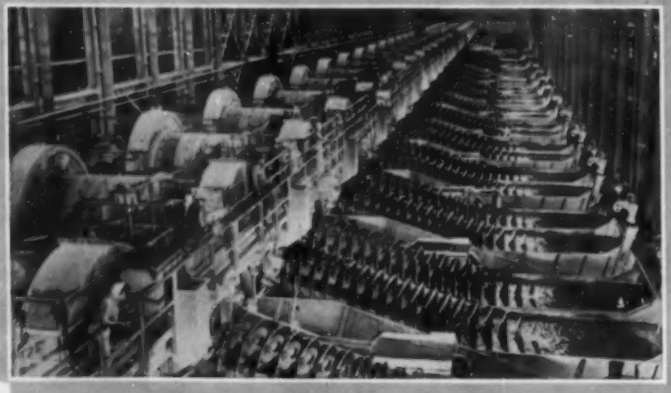
how MARCY MILL leadership in mechanical performance can help you cut costs

Grinding mills are selected on the basis of low-cost-per-ton output resulting from efficient, dependable mechanical and metallurgical performance. That's why so many successful mining companies throughout the world continue to order **and reorder** Marcy* Grate Discharge Ball Mills and Marcy Open End Rod Mills.

for example . . .

BEARINGS AND LUBRICATION

- the type of bearings and method of lubrication used are custom-engineered for each Marcy Mill to assure dependable, continuous operation, long life, maximum operating convenience on every installation...one of the many Marcy Mill features which result in low-cost-per-ton production.
- bearings are made with special Marcy Mill bronze, babbitt or micarta bushings.
- lubrication may be...
  - single or multi-bearing flood-oiling system with filtering, cooling and recirculation of oil.
  - by grease, oil or water.
  - automatic or by hand.
- hand operated oil jack for starting can be furnished if erection and operating conditions justify its use.
- water-cooled bearings can be furnished for dry grinding of hot materials.
- Marcy bearing design permits lifting the mill out of bearing base—always assuring proper alignment when reset.



Operating over 10 years without bearing replacement. These 10' x 10' Marcy Mills, with flood-oil lubrication, have been in operation more than 10 years without a bearing replacement.

*Both Marcy and Mesco are registered trademarks.

Licensed Manufacturers and Sales Representatives:
Canadian Vickers, Ltd., Montreal, Canada
The Austral Otis Eng. Co., Ltd., So. Melbourne, Austr.
Morgardshammers Mek. Verkstads Aktiebolag, Mogardshammar, Sweden
Pegson Limited (for England & Africa) Coalville, Leicestershire, England

Sales Agents:
W. R. Judson, Santiago, Chile
The Edward J. Nell Co., Manila, P. I.
The Ore & Chemical Corporation, 80 Broad Street, New York City 4, New York
Representatives for Continental Europe

WRITE FOR CATALOG

The Mine & Smelter Supply Co.
Denver 17, Colorado

OFFICES IN SALT LAKE CITY, EL PASO, 1775 BROADWAY, N. Y. C.

Hustlin' Production at Hibbing

BOULDERS AWAY! Big rocks are pushed aside like pebbles as Chanak's big red INTERNATIONAL TD-24 carve a new haul road up at the Mesabi.

SHOVIN' A SHOVEL. Valuable stripping time is gained as the TD-24 pushes a power shovel upgrade to a new digging location, just one of the many jobs handled daily by the Big Red INTERNATIONAL.

INTERNATIONAL TD-24 pays off big in Mesabi iron mining operation

Up in the Mesabi Range, S. T. Chanak & Sons of Hibbing, Minnesota, have found their Big Red INTERNATIONAL TD-24 crawler just what they need for road building, cleanup work, moving the big shovels, and working the spoil piles.

George Chanak lays it on the line: *"No other crawler but the TD-24 could keep us on schedule. There are so many times in this mining business when you need the strongest crawler you can get to move haul trucks up a slippery grade or push them out of deep mud in the bottom of the mines during the wet seasons. And the big shovels are always needing help to get around in the pits.*

"If that was all the TD-24 did, it would be worth its cost in the time it saves. But its real work comes when it pushes those heavy rocks away for new roads and when it is up on the spoil piles doing the work of two other tractors. We just plain couldn't do without a TD-24!"

See for yourself. Call your INTERNATIONAL Industrial Distributor for a demonstration whenever and wherever you wish. You'll get proof that INTERNATIONAL power is "power that pays!"

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS

For every move in Earthmoving

ON TRACKS ...ON RUBBER

See INTERNATIONAL'S "Job-Phased*" equipment

INTERNATIONAL HARVESTER

POWER THAT PAYS

INTERNATIONAL

*Phased Equipment—Machines designed and built to handle each major phase of earthmoving most efficiently and economically.

Are Your Drilling Costs Too High?

Keep them down with

SPEED FINN T10 and TAMPELLA AIR LEG

The Drill the Mines have waited for.

- Well-built air leg with a rugged air drill
- Designed for hard and medium-hard rock
- Engineered to give high number of piston blows per minute and features fast rotation
- Machine weighs 46.5 pounds—air leg weighs 38 pounds
- Air consumption only 57-72 cubic feet per minute
- In hard granite the machine drills 16-30 inches per minute
- Standard machine equipped with chuck for ⅞-inch Hexagonal tungsten carbide tipped steel with 4¼-inch shank
- Satisfaction for every user—try one and you will be convinced

A faster drilling machine of the same weight and low air consumption has not been reported to us.

Inquiries to:

Tammerfors Linne—och Jern-Manufaktur Aktie-Bolag

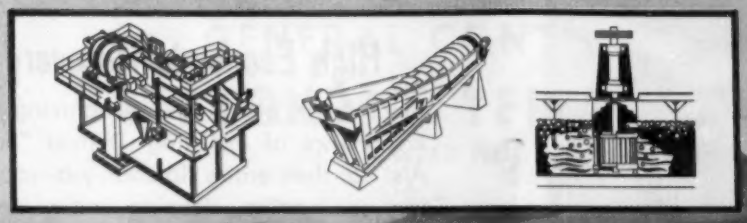
Agents requested in overseas countries

Tampella

Engineering Works

Tammerfors, Finland • Founded 1842

If you process ores...
YOU KNOW WEMCO



MOBIL-MILLS

S-H CLASSIFIERS

FAGERGREN FLOTATION MACHINES

Behind these familiar products is the WEMCO name and reputation — the reason you rely on WEMCO equipment to do your job **best.**

— *but here's something you may not know*

— WEMCO **also** makes a complete line of Thickeners, Hydroseparators and Diaphragm Pumps. Because they give you true WEMCO value — in performance, economy and reliability — you'll want to know more about them. Look over these specifications... it **pays** to know WEMCO.

WEMCO THICKENERS:

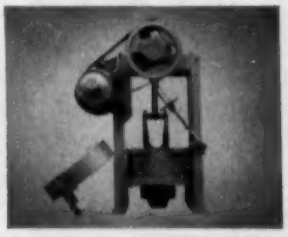
Sizes and Types: WEMCO Thickeners are job-tailored to specific applications and are available in sizes up to 400' diameter. Job requirements determine use of Beam (up to 45'), Lo-Truss (32' to 60'), Hi-Truss (60' to 100'), Center Pier (75' to 175') or Traction (125' to 400') type of construction.

Features: Depending on application, WEMCO Thickeners offer a wide choice of construction and mechanical features. These include: heavy duty worm or spur gear mechanisms and bearings; large feed wells; strong cast spiders; overload alarms; manual or motorized screw lifting devices on small sizes; vertical hydraulic lift on Center Pier type; chain and sprocket gear-motor drive on small sizes; dual fluid drive on Center Pier and Traction types; large diameter discharge cones; wood or steel tanks.

WEMCO HYDROSEPARATORS:

Sizes and Types: WEMCO Hydroseparators are available in sizes up to 100' diameter. Duty requirements determine use of Beam (up to 40'), Lo-Truss (35' to 55'), or Hi-Truss (55' to 100') type of construction.

Features: Depending on job requirements, WEMCO Hydroseparators offer a wide range of construction and mechanical features, including: heavy duty worm gear mechanisms and bearings, large diameter cold rolled steel shafts, large feed wells and discharge cones, strong cast spiders, manual or motorized lifting devices and efficient drive arrangements.



WEMCO DIAPHRAGM PUMPS:

Sizes and Types: WEMCO Diaphragm Pumps are available in 2", 3" and 4" sizes. Each size can be obtained in either simplex, duplex or triplex arrangements.

Features: WEMCO Diaphragm Pumps are designed and built for efficient, trouble-free operation. Features include: Rugged welded steel frame, uniformly weighted rubber ball valves, rubber valve seats, long wearing rubber diaphragm, adjustable stroke and indicator, handwheel-operated variable speed drive for speed adjustment while pump is in operation.

FOR FURTHER INFORMATION—Call or write to your nearest WEMCO sales engineer. He will be glad to give you full details.

PRINCIPAL OFFICES

San Francisco
Sacramento
Salt Lake City
Spokane
Chicago
New York
Toronto, Canada
Hibbing, Minnesota
Denver
Phoenix
Birmingham
Jeffersonville, Indiana

EXPORT DISTRIBUTORS

Fraser & Chalmers (S.A.) (Pty.) Limited
P.O. Box 619, Johannesburg, South Africa

Lilestone & Co., Inc.,
P.O. Box 3368, Manila, Philippines

United Development Corporation Pty. Ltd.
P.O. Box 3460, Sydney, N.S.W., Australia

Corporation Commercial Sudamericana S. A.
Casilla 505, Lima, Peru

The Sumitomo Machinery Co., Ltd.
5-22 Kitahama, Higashi-Ku, Osaka, Japan

WEMCO
WESTERN MACHINERY COMPANY
760-766 FOLSOM STREET · SAN FRANCISCO 7 · CALIFORNIA

Mobil-Mills • Coal Spirals • HMS Thickeners • HMS Pumps • Sand Pumps • Agitators Cone Separators • Drum Separators • Hydroseparators • Fagergren Laboratory Units Fagergren & Steffenson Flotation Machines • S-H Classifiers • Attrition Machines HMS Laboratory Units • Dewatering Spirals • Thickeners • Conditioners • Benefiers

Use *Denver "Sub-A" Flotation Machines* for Roughing, Scavenging and Cleaning

DENVER "SUB-A'S" RECOVERING NICKEL: In Canada, Denver "Sub-A's" play an important part in processing 40,000 tons a day of nickel-copper ore. Here are several of the 552 No. 30 (56x56) Denver "Sub-A" Flotation Cells operated by this company. Denver "Sub-A" Flotation was selected after extensive tests. Denver "Sub-A" Flotation is standard in practically all copper-nickel mills.

High Economic Recovery

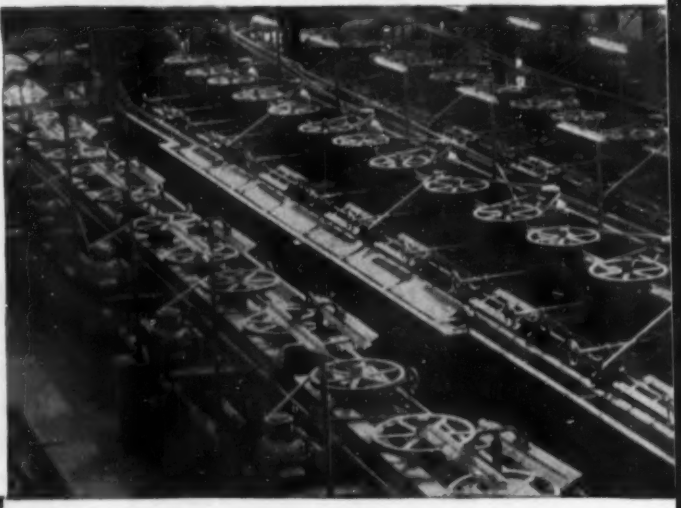
More large plants are recognizing the importance of installing Denver "Sub-A's" for their entire flotation job—roughing, scavenging, cleaning and re-cleaning. This practice results in maximum recovery and lowest cost per ton of ore treated.

DENVER "SUB-A'S" RECOVERING COPPER: Here 5000 tons of copper ore per day are processed in 120 No. 30 (56x56) and 32 No. 24 (43x43) Denver "Sub-A" Flotation Cells. These cells were installed for both roughing and cleaning after a series of competitive tests with other flotation machines.

High Grade Concentrate

Denver "Sub-A's" are recognized the world over for their ability to produce high grade selective concentrates.

DENVER "SUB-A'S" RECOVERING LEAD AND ZINC: Denver "Sub-A" Flotation Cells in large Australian lead-zinc mill. Lead rougher flotation is accomplished in a 12-cell No. 30 (56x56) Denver "Sub-A" and cleaning is done in a 10-cell No. 24 (43x43) Denver "Sub-A." Zinc flotation is performed with identical units.



Low Maintenance and Power Cost

The Denver "Sub-A" is easy to maintain. Many operators report wearing life of parts of 2 to 15 years. Power is low and used efficiently. No pumps are required to recirculate froth and middlings in the cleaning circuits.

For further details on improving your flotation circuit, please write to DENVER EQUIPMENT COMPANY, 1400 17th St., Denver 17, Colorado, phone CHerry 4-4466.

DECO — Denver Equipment Company — 24 Hour Service

Complete Mill Equipment. You have one manufacturer—one responsibility.

DENVER EQUIPMENT CO.

1400 17TH ST., DENVER 17, COLO.

Denver Equipment 24 Hour Service Company

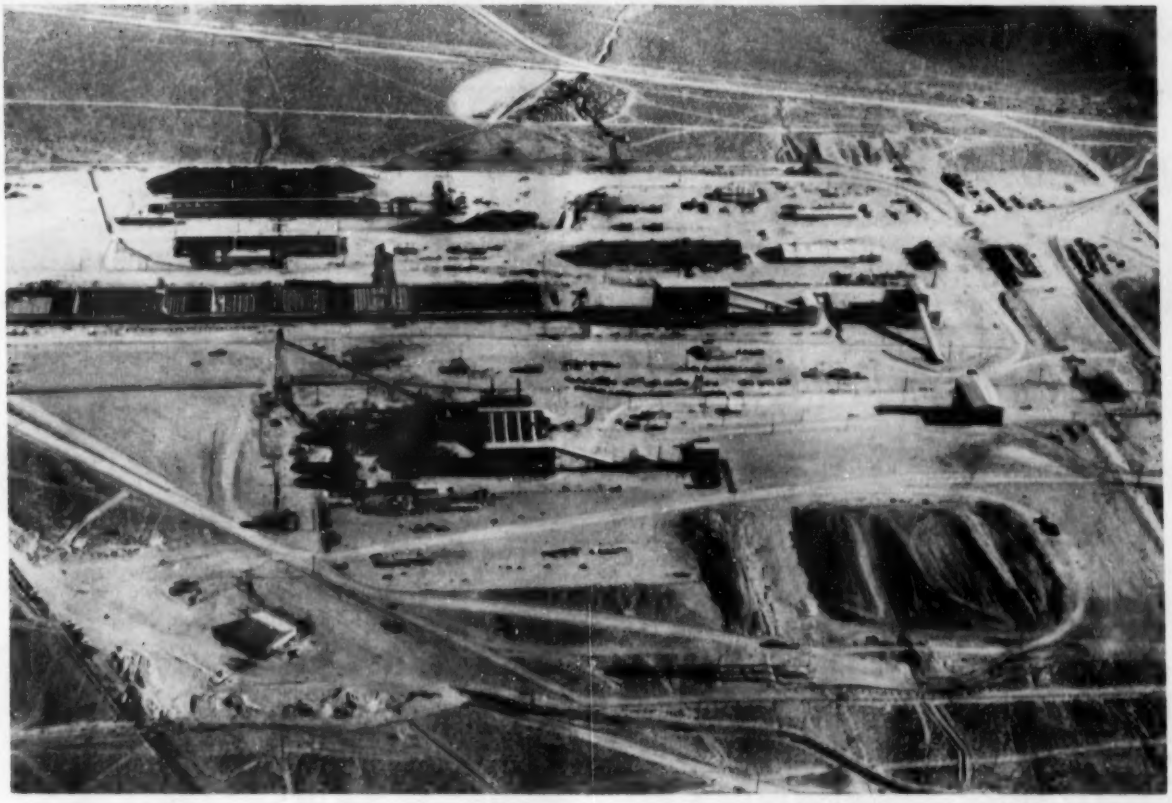
Standard Reliable 24 Hour Service Efficient

J. A. McNeil Co., Inc.

GENERAL CONTRACTORS FOR

ANACONDA'S YERINGTON PROJECT

WEED HEIGHTS, NEVADA



DESIGNED AND BUILT UNDER SUPERVISION OF

Wilbur S. Jurden, Sr.
CHIEF ENGINEER

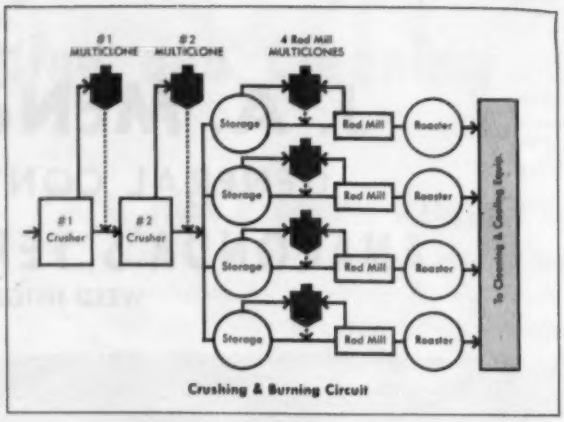
ANACONDA COPPER MINING CO.

J. A. McNeil Co., Inc.

3115 Mission Road
Cable Adress: Jamac

Alhambra, Calif.
CUmberland 3-3756

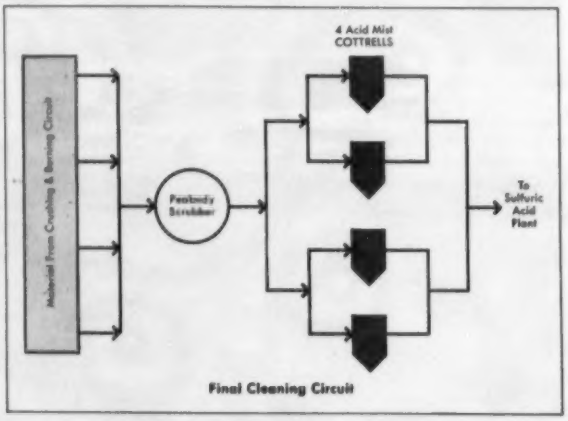
6 MULTICLONE
DUST COLLECTORS



Crushing & Burning Circuit

and 4 Western Precipitation COTTRELLS
serve Anaconda at Yerington!

These Cottrells are the newest Western Precipitation acid mist design



Final Cleaning Circuit

Anaconda selected six Western Precipitation MULTICLONES *and four Western Precipitation* COTTRELL *Electrical Precipitators to handle key recovery operations at its new $30,000,000 Yerington installation.*

THE 6 MULTICLONES are installed in the sulfur crushing plant where sulfur ore is crushed and ground for use in the Roaster operations. Since this crushing and grinding develops a considerable dust problem, the primary crusher (a jaw type), the secondary crusher (a cone type), and each of the 4 rod mills has an individual 9VG Multiclone Mechanical Collector installed for recovering suspensions from the exhaust gases.

So efficient are these Multiclones that the exhaust gases are practically free of all visually discernible dust!

Inasmuch as each crusher and mill has its own Multiclone unit, maximum flexibility in plant operation is achieved—with greatly simplified duct and dampering requirements. Savings in plant maintenance are also obtained by having the Multiclones ahead of the fans so that abrasive dusts are removed and only the clean gas reaches the fan equipment.

THE 4 COTTRELLS are installed in the acid plant process to electrically precipitate the acid and water mist from the SO_2 gas generated in the Fluosolid Roasters. From the Cottrells the gas passes directly into the contact acid plant where it is converted into sulfuric acid.

The four Cottrells have 100 pipes each, and are designed for a capacity of 33,900 cfm at 110°F. with a negative pressure of 30" w.g. and a recovery efficiency of 99.0%!

These Cottrells are the first acid mist precipitators to incorporate a new advancement developed by Western Precipitation engineers... top support of the high voltage electrode system coupled with wind-swept insulator compartments. This new design eliminates difficulties associated with conventional oil-sealed insulator compartments and is a major advancement in this type of Cottrell design.

The Weed-Heights installation is one more example of the flexibility and adaptability of Western Precipitation recovery equipment to varying operating requirements. Remember — Western Precipitation designs, engineers and installs BOTH *electrical* (Cottrell) and *mechanical* (Multiclone) recovery systems — therefore can give an unbiased recommendation on the type best suited to your particular requirements. A wire, letter or phone call to our nearest office places this unmatched "know-how" at your service!

Send for helpful literature!

® "Multiclone"

WESTERN Precipitation CORPORATION

DESIGNERS AND MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

Main Offices: 1036 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA
CHRYSLER BLDG., NEW YORK 17 • 1 N. La SALLE ST. BLDG., CHICAGO 2
1429 PEACHTREE ST. N.E., ATLANTA 5 • HOBART BLDG., SAN FRANCISCO 4
PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL

TRUCO CORING BIT

TRUCO CONCAVE BLAST HOLE BIT

TRUCO PILOT BIT

TRUCO IMPREGNATED CORING BIT

TRUCO REAMING SHELLS

TRUCO STANDARD OIL FIELD BIT

FINEST QUALITY DRILL BORTZ

"Sell it and make your fortune Mynheer Van Niekirk"

It was the year 1876. Free America was 100 years old and there were great celebrations in Philadelphia. In London, Queen Victoria was proclaimed Empress of India.

In South Africa, children playing by the Orange River found a bright pebble, too pretty to throw away, but when trader Van Niekirk offered to buy it they shouted with laughter and told him to sell it and make his fortune.

But, nobody wanted to buy the pebble so Van Niekirk dropped it in an envelope and mailed it to a government agent who declared it to be a diamond of 21 carats. Then, the governor of the Colony bought it for five hundred pounds and sent it to the Paris Exhibition as a curiosity.

Nobody paid much attention, but this was the first clue to the existence of the diamond fields that would one day pour out fabulous treasures in gems—and in industrial diamonds, those incomparable cutting points which are the vital time-saving, cost-reducing element in Truco Diamond Bits.

With Truco Diamond Bits you get irresistible cutting power in any formation; swift, accurate penetration that reduces rig time and pays off handsomely in cash savings. May we send you our Truco Diamond Bit Catalog?

TRUCO DIAMOND BITS

by

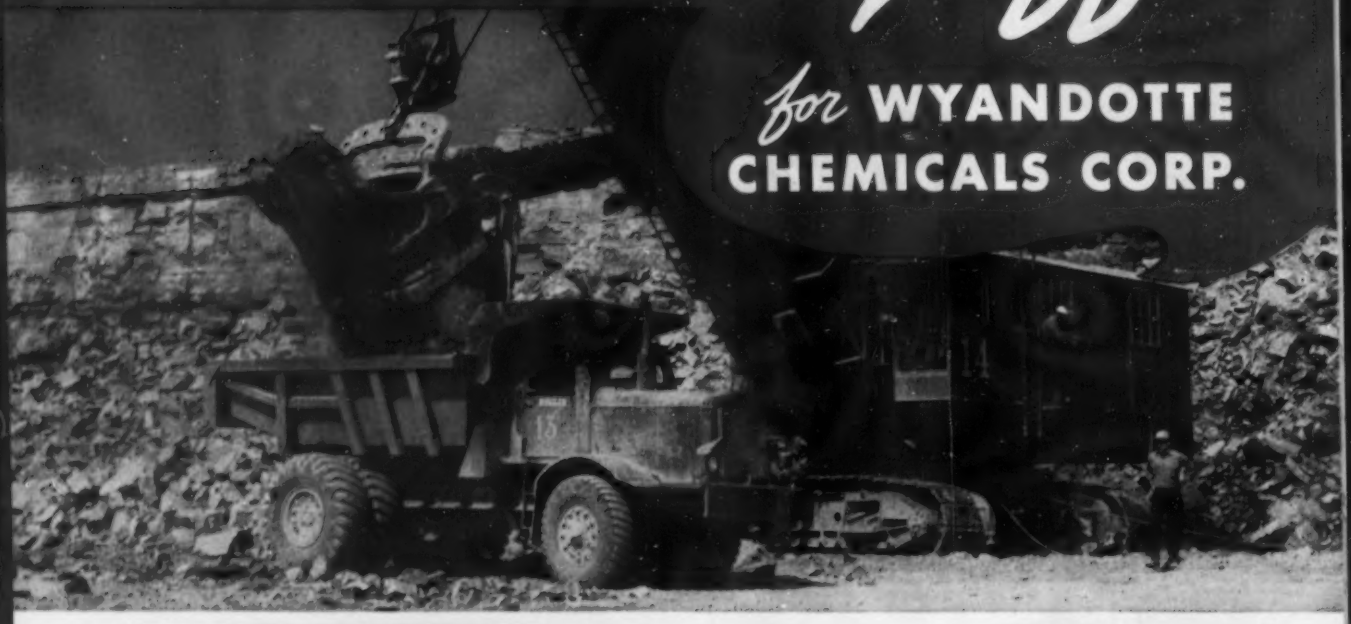
WHEEL TRUEING TOOL COMPANY

3200 W. Davison Avenue, Detroit 38, Michigan

WHEEL TRUEING TOOL CO. OF CANADA, LTD.
575 Langlois Avenue, Windsor, Ont., Canada

"Eucs" Pay Off

for WYANDOTTE CHEMICALS CORP.



22,000 hours...still going strong!

At Alpena, Michigan, Wyandotte Chemicals Corp. operates one of the world's largest limestone quarries—another job where "Eucs" are paying off in more loads per hour at less operating and maintenance cost.

Seven years ago Rear-Dump Euclids of 22-ton capacity replaced an electric haulage system for moving rock from the quarry face to the plant. Loaded with stone by shovels of 5 and 6 cu. yd. capacity, and hauling overburden during the winter months, these fourteen "Eucs" have worked an average of 22,000 hours each. On a two mile round trip haul, each "Euc" delivers approximately 75 tons per hour for a total of more than 3 million ton-miles per unit.

Wyandotte standardized on Rear-Dump Euclids because of their job proved dependability on hundreds of mine and quarry operations. Performance records prove this decision has paid off because "Euc" speed, capacity and efficiency have increased production and lowered hauling costs at Alpena.

Your nearby Euclid distributor will be glad to discuss your off-the-road hauling problems and show you how and why "Eucs" can do a better job for you.

EUCLID DIVISION GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

Cable Yuklid - Code Bentley

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

GM GENERAL MOTORS

Open pit stripping at ANACONDA'S

LEVIATHAN MINE

The Anaconda Leviathan Mine Operating Plan calls for stripping 19,000,000 tons of overburden. Isbell men and equipment have moved 15,800,000 tons since June 1952, and are now stripping an average of 900,000 tons per month. In this and similar operations, the Isbell organization has moved over 216 million tons, with a team well trained and experienced in know-how.

ISBELL experience in open pit MINING

Isbell experience in volume earth moving and selective open pit mining is long established. Isbell teams have successfully mined or stripped copper, gold, lead, sulphur, manganese, tungsten, uranium, zinc, and non-metallics. Isbell has available the equipment, engineering, management, and operating personnel for jobs anywhere.

NOW OPERATING IN

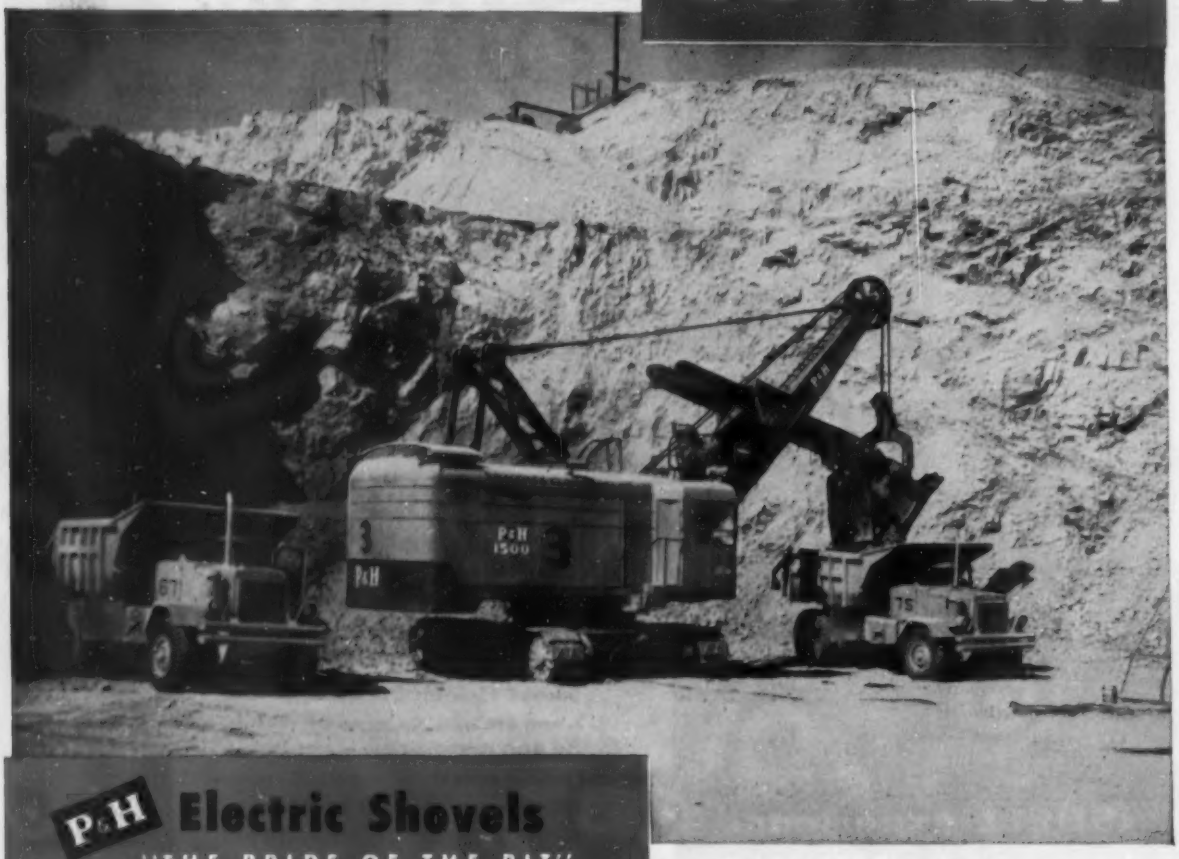
ARIZONA
CALIFORNIA
NEW MEXICO
NEVADA
WASHINGTON

P. O. BOX 2351 • RENO, NEVADA
TELEPHONE 3-7135

ISBELL
CONSTRUCTION COMPANY

A million yards a month

. . . stripping COPPER!



P&H Electric Shovels

"THE PRIDE OF THE PIT"

Since July 1952 at Anaconda's new mine in Nevada, four 5-yard P&H Model 1500 Electric Shovels have been stripping overburden and copper ore on a 24-hour schedule, 6 days a week. Average production for each machine is 7,000 tons per 8-hour shift, as the Yerington mines ore production reaches 11,000 tons per day. Much of this digging has been done in ground without resorting to blasting.

It's the kind of digging where P&H performance shows up such advanced features as all-welded construction, Magnetorque* hoist, independent propel, powerful worm crowd, stepless control. Remember, too, that P&H electrical equipment is designed and built for shovel service.

Steady, dependable production at low tonnage cost — that's the reason why every third P&H Electric Shovel sold is a repeat order. Get the facts. Ask us to send Bulletin X-139.

*T.M. of Harnischfeger Corporation for electro-magnetic type coupling.

P&H LARGE EXCAVATOR DIVISION

HARNISCHFEGER CORPORATION

MILWAUKEE 46, WISCONSIN

the P&H Line

"... drillers insist on Union's DRILLUBE"

J. Irving Crowell, Jr., Beatty, Nevada

"I suppose the big reason why my drillers insist on Union's Drillube is that air drills lubricated with it don't fog or give off sickening oil fumes.

"Although that reason alone would amply justify its use in our fluorspar mine, I've found that Drillube's fine protective qualities keep our pneumatic equipment in excellent condition with a minimum of maintenance expense and parts replacement."

Especially engineered by Union Oil Company for mining use, Drillube's high film strength and emulsifying qualities assure steel-against-steel lubrication under wet air conditions. Drillube's low cold test makes it resistant to refrigerating action of compressed air... its high flash point protects against ignition in service. Your local Union Oil representative can supply you. Why not order Drillube for your air equipment today?

UNION OIL COMPANY
OF CALIFORNIA

76

Los Angeles: *Union Oil Bldg.* • ***New York:*** *45 Rockefeller Plaza* • ***Chicago:*** *1612 Bankers Bldg.* • ***New Orleans:*** *644 National Bank of Commerce Bldg.* • ***Atlanta:*** *401 Atlanta National Bldg.* • ***Kansas City, Mo.:*** *921 Rialto Bldg.*

QUESTION* **How much more material is there in a Three-Inch-Higher Windrow . . . 9% . . . 18% . . . 31% . . . ?**

Cross section of an average, 21-inch high windrow . . . the area (width x height ÷ 2) is 614 sq in.

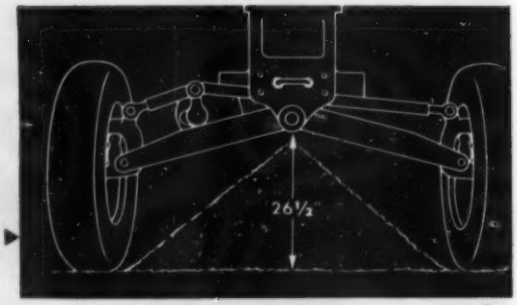
Now increase the height of the windrow by 3 in. The cross-section area now equals 804 sq in.

The difference: 190 sq in, over 30 percent more area, meaning over 30 *percent more yardage.*

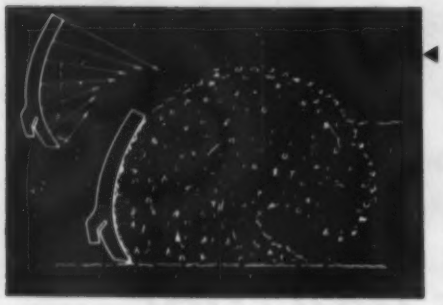
*Only a Combination of Advanced Design Features Lets a Motor Grader Handle Big Loads Fast

To take full advantage of even a *three-inch* difference in windrow height (as explained above) a heavy-duty motor grader needs new design and performance characteristics from front to rear and top to bottom.

Let's analyze the Allis-Chalmers 104-brake-horsepower AD-40 to see how it measures up to these stiff requirements.



1 **A HIGH-ARCH FRONT AXLE** to straddle big windrows . . . take advantage of that three-inch difference and let big loads pass through to the blade.



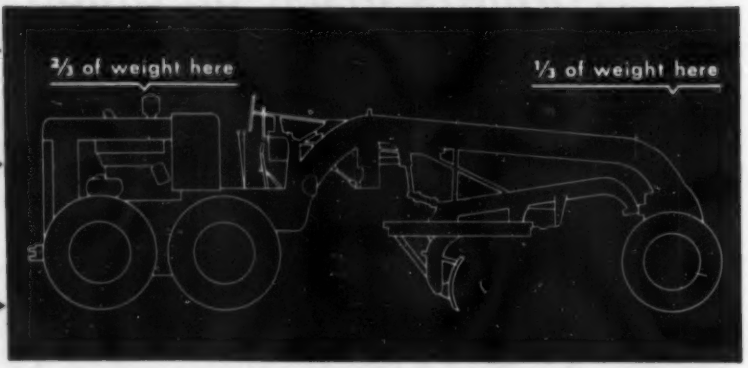
2 **A ROLLING-ACTION MOLDBOARD** . . . to insure a "live" load that rolls freely off the blade . . . moves the load faster and takes full advantage of engine power.

3 **AMPLE THROAT CLEARANCE** . . . to handle 30 percent bigger loads without disturbing free, rolling action . . . and without jamming dirt, oil-mix or any other material against the circle.

4 **FULL BLADE FREEDOM** . . . the exclusive tubular frame and a long tubular drawbar insure full blading effectiveness on the road, in the ditch or on the slope.

5 **BALANCED POWER, WEIGHT AND TRACTION** . . . a heavy-duty engine and *two-thirds* of the weight concentrated on tandem-drive rear wheels provide the best in traction, positive blade pressure and steer-ability.

6 **EASY CONTROL AND VISIBILITY** — A big platform with plenty of leg room, adjustable seat and steering wheel, power steering, assures working ease. Single member frame, low control board and tapered platform corners provide "pilot-house" visibility.

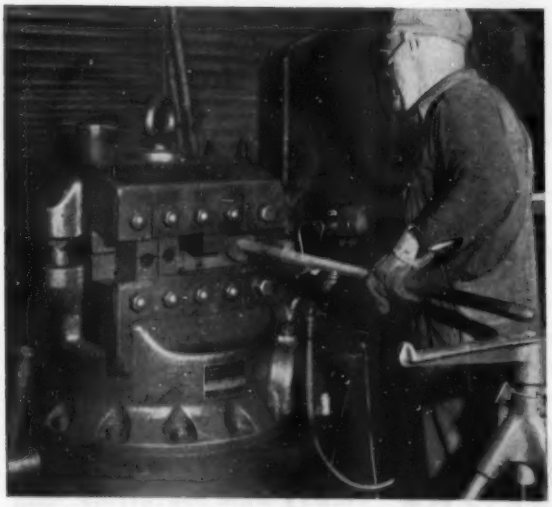


Your Allis-Chalmers dealer will be glad to show you how the AD-40 gives you the *differences* that mean more work done . . . by a demonstration under on-the-job conditions.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

This mobile jumbo mounts three drifters for drilling a fast round in the footwall slate as headings are advanced on the 2,400-ft level. Carbide-tipped bits and Bethlehem hollow drill steel are relied on to keep the job on the move.

Driving an 8,800-ft drift to open up large tonnages of Marquette ore



The sharpener operator shanks a 1-in. quarter-octagon rod in the well-equipped drill steel shop operated by the Mather Mine.

Photos courtesy of H. H. Korpinen, Superintendent, Mather Mine.

A substantial increase in the production of iron ore at the Mather Mine depends on a newly-driven drift which connects the famous A and B shafts located at Ishpeming and Negaunee, Michigan. Being driven from two headings on the seventh level, 2,400 ft below the surface, the main level drift makes it possible to turn cross-cuts under sizable ore bodies.

Drilling, blasting, and mucking were carried on at a fast pace from the time the project was begun in early 1951. From start to finish, they have relied on Bethlehem hollow drill steel to help keep the drilling on schedule, both in this vital haulage tunnel and elsewhere at this property.

The management expects the output of iron ore at this mine to reach an annual capacity of 3 million tons.

Leading mines everywhere depend on Bethlehem hollow drill steel. It's supplied in two grades: straight carbon and ultra-alloy, our chrome-moly grade.

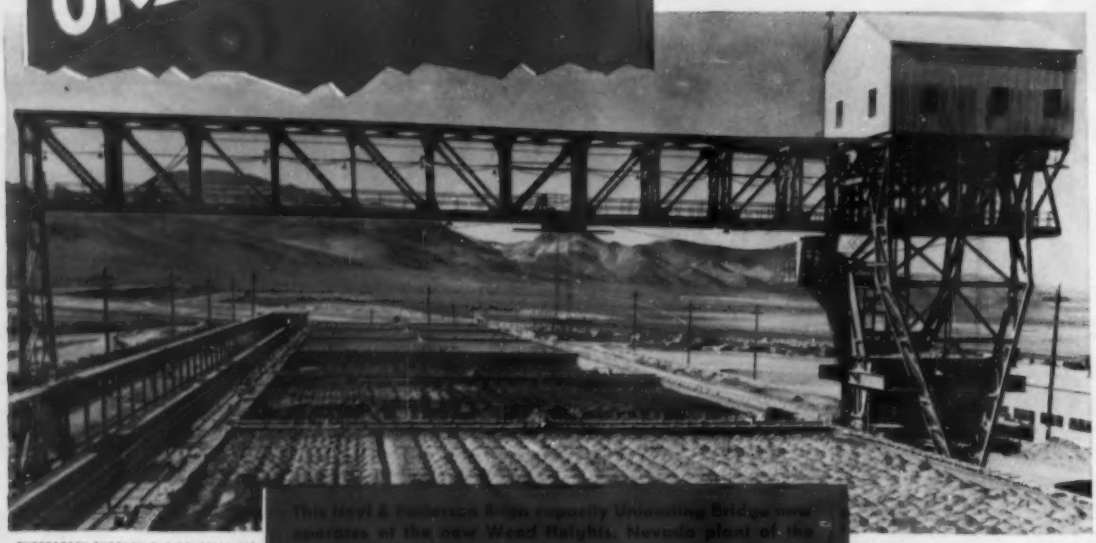
BETHLEHEM PACIFIC COAST STEEL CORPORATION

Sales Offices: Los Angeles, San Francisco, Portland, Seattle, Spokane

BETHLEHEM PACIFIC

BETHLEHEM STEEL

ONE OF A KIND... *For a Reason!*



PHOTOGRAPH THROUGH THE COURTESY OF ANACONDA COPPER MINING COMPANY

This Heyl & Patterson 8-ton capacity Unloading Bridge now operates at the new Weed Heights, Nevada plant of the Anaconda Copper Mining Company. A Heyl & Patterson Loading Bridge and a Heyl & Patterson Gantry Crane also

This Unloading Bridge was specifically designed and built by Heyl & Patterson to perform one definite function for Anaconda Copper Mining Company . . . to dig tailings from the leaching vats at Anaconda's new Weed Heights, Nevada plant and load these tailings, by way of a hopper, into trucks for disposal.

This bridge operates smoothly and efficiently without wasting time, motion or power because it was designed particularly for this one job.

When *your* problem centers around the handling and transportation of ore, coal or other heavy bulk materials . . . the wisest move you can make is to consult Heyl & Patterson, specialists in this field for over 60 years.

Heyl & Patterson has the complete facilities necessary to answer your Heavy Bulk Materials Handling problem. We have our own engineering department . . . our own machine shop . . . our own research department . . . and our own service department.

Call on Heyl & Patterson to help you. An experienced Heyl & Patterson engineer will gladly talk over your problem with you at no obligation.

Ore Bridges
Railroad Car Dumpers
High Lift-Turnover-Rotary
Coal Preparation Plants
Coal & Coke Handling Equipment
Boat Loaders and Unloaders
Rotary Mine Car Dumpers
Coal Crushers
Coal Storage Bridges
Car Hauls and Boat Movers
Bradford Breakers
Refuse Disposal Cars
Thorsten Coal Sampling Systems
Kinney Car Unloaders
Pig Iron Casting Machines
Cyclone Thickeners
Thermal Dryers
The Drying Dutchman
Reineveld Centrifugal Dryer

Heyl & Patterson, Inc.

"SINCE 1887"

55 FORT PITT BLVD. PITTSBURGH 22, PA.

Heavy Bulk Materials Handling Equipment

All The Way from Design to Erection

It costs time and money to be ONE DIPPER LATE!

Amsco manganese steel dippers are regularly ordered for replacement on equipment in the field. Often they go to users who found that ordinary steel dippers simply would not hold up.

It's smart economy to specify tough, dependable Amsco dippers with original equipment.

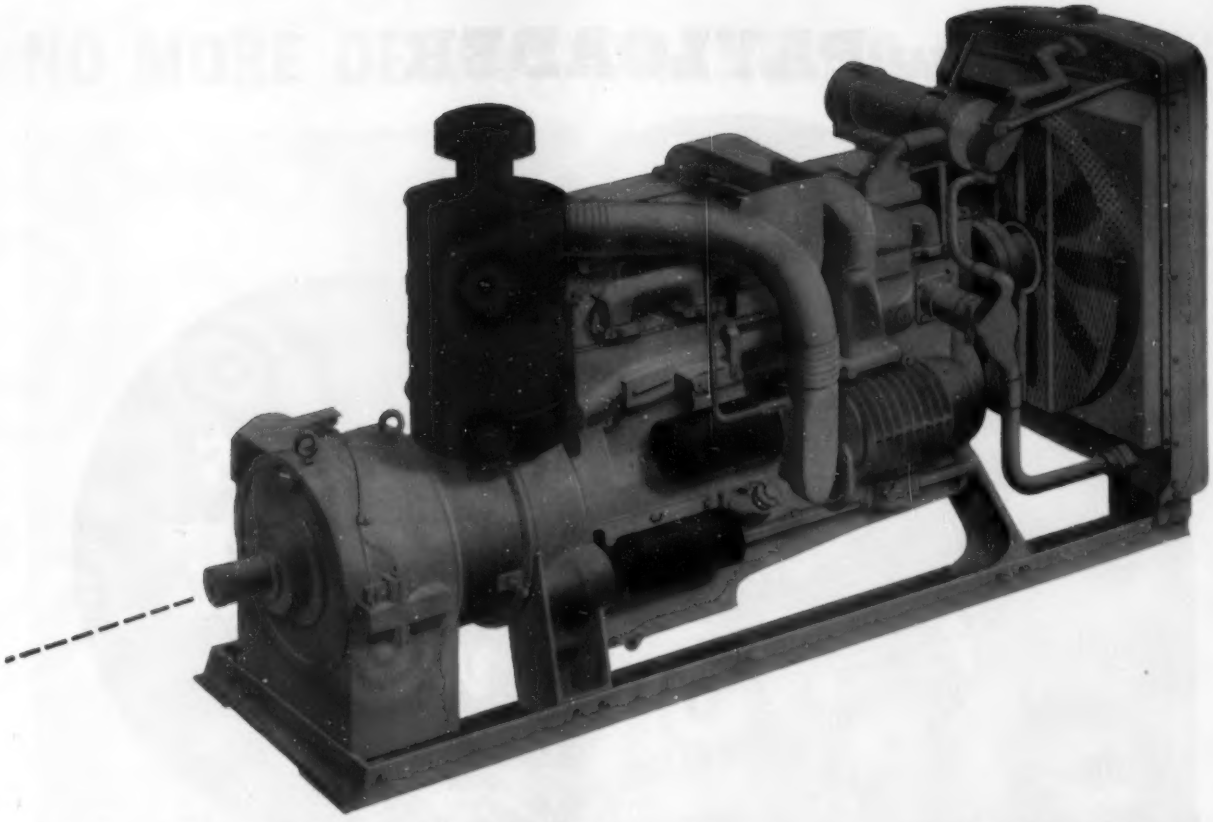
Next time you order a power shovel or a replacement dipper, specify long life right on your purchase order . . . specify an Amsco manganese steel dipper.

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Ill.

Cummins Diesel - torque converter package speeds work cycle as much as 30%

Gives full utilization of horsepower, minimizes shock



loads, adds to life of shovels, cranes, and draglines

Cummins Torque Converter Packages give smooth steady power over the entire digging or working cycle. Even where digging is the toughest and power requirements fluctuate widely, the Cummins Torque Converter maintains power without lugging, stalling or overspeeding. Crane work, too, can be speeded because loads can be handled more smoothly and accurately.

The output of the Cummins Torque Converter Package is measured by an output shaft governor which determines the exact amount of power required each instant and automatically matches engine speed to load requirements. This increases work capacity, adds to equipment life, saves fuel and engine wear.

Cummins Diesels, ranging from 60 to 600 h.p., equipped with one of many types of torque converters, can match any job you have. Available as replacement units or in many makes of new equipment.

CUMMINS

Cummins Engine Company, Inc.
Columbus, Indiana

Rugged diesel power (60-600 h.p.)

SAN FRANCISCO
Watson & Meehan
Branches: FRESNO; REDDING. *Authorized Sales & Service:* STOCKTON—Stockton Fuel Pump & Injector Service; SACRAMENTO—Frank J. Coyle; EUREKA—Fred E. Barnett; RENO—Nevada Transit Company.

LOS ANGELES
Cummins Service & Sales
Branch: BAKERSFIELD. *Authorized Sales & Service:* BISHOP—Inyo Diesel Service; BLYTHE—Leo's Diesel Service; COLTON—Smith's Diesel Sales; EL CENTRO—Rhyne's Automotive Service; SAN LUIS OBISPO—San Luis Truck Service; SAN DIEGO—E. W. Equipment Company; SANTA MARIA—Hanson Equipment Co.; BAKER—Newton Automotive Service; LAS VEGAS—Stirling Diesel Service.

PHOENIX
Cummins & Moran
Authorized Sales & Service:
YUMA—Cooper Tractor Service.

SALT LAKE CITY
Cummins Intermountain Diesel Sales Co.
Authorized Sales & Service: CEDAR CITY—Wally's Chevron Truck Service; IDAHO FALLS—Automotive Body and Machine, Inc.

(5-18-54)

a new PAYLOADER®

LOOKS THE SAME... BUT DOES MORE WORK

Four-wheel-drive • Torque converter • 4-speed, full-reversing transmission • Power-steering • Hydraulic brakes Quick tip-back bucket • Automatic bucket positioning.

MODEL **HRC**

CAPACITY
1 CU. YD. STRUCK-LOAD
1⅛ CU. YD. PAYLOAD

HERE IS THE FINEST tractor-shovel for its size ever built. It has undergone extensive field testing that proves it is without equal in work output, versatility, ruggedness and ease of operation. Its unique combination of torque converter drive and Hough four-speed, full-reversing transmission provides "just-right" speeds, forward and reverse, for every job — plus smooth, shockless power flow at all times.

Your "PAYLOADER" Distributor is eager to explain ALL the advantages of the Model HRC and show what it will do for you.

THE FRANK G. HOUGH CO.
Libertyville, Illinois

Please send me more information on the new HRC

NAME.....

TITLE.....

COMPANY.....

STREET.....

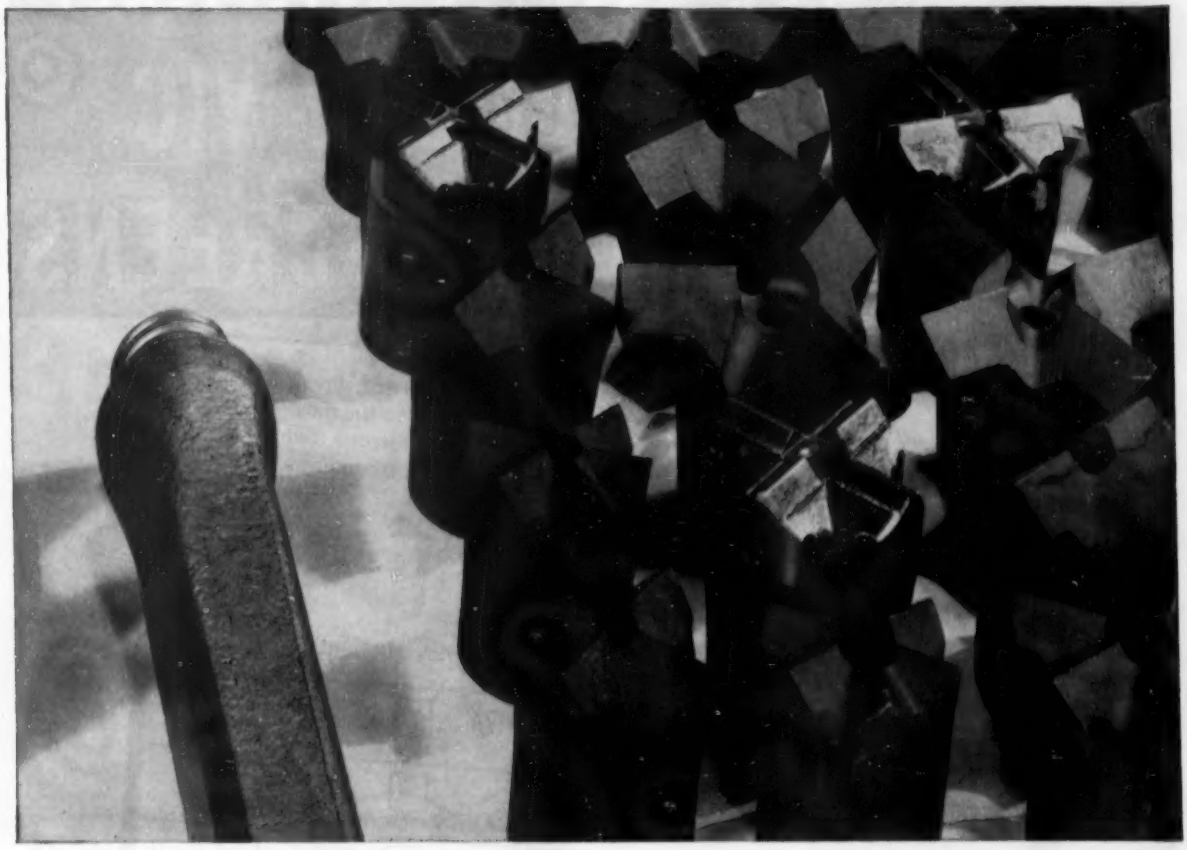
CITY.....STATE.....

☐ Please have Distributor call
☐ Send information on all seven PAYLOADER models

757

PAYLOADER®
THE FRANK G. HOUGH CO. • LIBERTYVILLE, ILL.
859 SUNNYSIDE AVE.

NO MORE DELAYS CHANGING STEELS!



Both TIMKEN® rock bit types are interchangeable on the same drill steel!

WHY should your drillers waste valuable drilling time going after a different set of drill steels every time they need a different type of rock bit? Timken® multi-use and carbide insert bits eliminate this costly delay, because dozens of them fit the same threaded drill steel! It takes just a minute to unscrew one type of Timken bit and screw on another different bit—right on the same steel, right on the job!

With Timken interchangeable rock bits, you get more drilling economy, because you can switch to the most economical bit as the ground changes. And because dozens of different Timken multi-use and carbide insert bits fit the same steel, you eliminate the need for stocking a large inventory of drill steels.

Both Timken multi-use and carbide insert bits are made from electric furnace Timken fine alloy steel. And their special shoulder unions keep drilling impact from damaging threads.

Our rock bit engineers will be glad to help you with your drilling problems by analyzing your operations. They're experts at cutting drilling costs. There's no obligation. Just write to: The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

WHERE YOU CUT COSTS WITH TIMKEN MULTI-USE BITS

Most economical for ordinary ground. With correct control and reconditioning, they give lowest cost per foot of hole when full increments of steel can be drilled.

WHERE YOU CUT COSTS WITH TIMKEN CARBIDE INSERT BITS

Give highest speed through hard, abrasive ground. Also most economical for constant-gage holes, small diameter holes, very deep holes.

... your best bet for the best bit... for every job

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

FOR GREATER EFFICIENCY

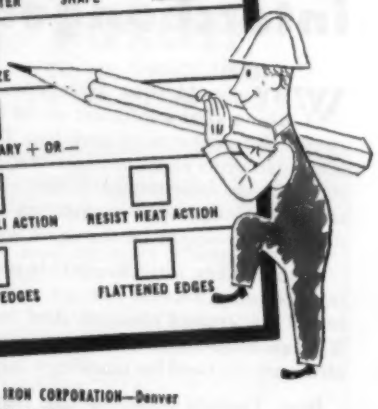
buy CF&I CAL-WIC INDUSTRIAL SCREENS

Let CF&I engineers help select the best CAL-WIC screen for your operation. CAL-WIC screens are woven to the most exacting specifications and are available in ferrous and non-ferrous metals to meet individual requirements.

SELECTING THE RIGHT SCREEN FOR EVERY PURPOSE . . . CHECK THE EQ

(efficiency quotient)

TYPE OF EQUIPMENT . . .	☐ VIBRATING	☐ REVOLVING	☐ STATIONARY		
SCREEN WILL BE OPERATED . . .	☐ HORIZONTALLY	☐ VERTICALLY	☐ AT AN ANGLE		
MAJOR IMPORTANCE IS . . .	☐ ACCURATE GRADING	☐ TONNAGE	☐ LIFE OF SCREEN		
MATERIAL TO BE SCREENED . . .	☐ DRY	☐ DAMP	☐ WITH WATER	☐ SHAPE	☐ ABRASIVE
RATIO IN FEED TO THE SCREEN . . .	☐ OVERSIZE	☐ UNDERSIZE			
LIMITATIONS OF SIZE VARIATIONS . . .	☐ WIRE MAY VARY + OR —	☐ OPENING MAY VARY + OR —			
ANY SPECIAL REQUIREMENT . . .	☐ RESIST ACID ACTION	☐ RESIST ALKALI ACTION	☐ RESIST HEAT ACTION		
TYPE OF EDGE PREPARATION . . .	☐ HOOK STRIP	☐ WELDED EDGES	☐ FLATTENED EDGES		



THE COLORADO FUEL AND IRON CORPORATION—Denver
PACIFIC COAST DIVISION—Oakland
WICKWIRE SPENCER STEEL DIVISION—New York

CAL-WIC INDUSTRIAL SCREENS CF&I
THE COLORADO FUEL AND IRON CORPORATION

Now a Division of Sanford-Day Iron Works

A Combining of Products, Engineering Ability and Manufacturing Equipment to Serve Mining More Economically

Sanford-Day Iron Works and The Brown-Fayro Company are pleased to inform the mining industry that Sanford-Day has acquired the assets of The Brown-Fayro Co., Johnstown, Pennsylvania. The Brown-Fayro Co. will be known as the Brown-Fayro Division of Sanford-Day Iron Works, Inc. Mr. C. O. Crump, president of The Brown-Fayro Co., will continue as manager of our Brown-Fayro Division.

Brown-Fayro has, for almost 40 years, manufactured room, rigging, car spotting and car moving hoists, mine pumps, hoist and car retarders, mine and man cars, wheels and trucks, rerailers and derailers, mine blowers, sheaves and rollers, check and foot valves and oil spray outfits.

Early in 1917, the "Brownie" room hoist was developed for the handling of mine cars in working places. In 1926 a gravity type railroad car retarder was developed. This was the beginning of the line of railroad car handling equipment which now covers several types and sizes of retarders and hoist-retarders. About 1928, the company developed a slow speed heavy duty car spotting hoist, which was the forerunner of a line which now includes several models. A barney type spotter was brought out in 1941 and a hydraulically operated one more recently. Brown-Fayro pioneered the "cold oil" method for dust control and freeze-proofing of coal.

In 1951 we at Sanford-Day celebrated our fiftieth year of building mine cars and wheels for the mining industry. The automatic mine car haulage system was pioneered and developed by Sanford-Day. In addition, we have originated most of the improvements in design and construction of mine cars and wheels.

Sanford-Day designed and built the first successful anti-friction bearing wheel for mine cars . . . the first low bottom car and the first high capacity rotary dump car. Other firsts were the "ball bearing" mine car wheel, the bottom dumping mine car, the latch lever and the "Twin Safety Latches" for bottom dumping cars. Recently, we designed and began building a revolutionary new granby car for metal mines.

We mention these facts with pride because they have been tremendous factors in lowering the production costs of mining over the years.

Serving the mining industry more economically is the prime factor in the merged experience, ability and products of the two firms. The Brown-Fayro policies that have built a wonderful reputation and confidence in their products will be continued.

BROWN-FAYRO DIVISION

The "Brownie" Line
Rigging, Car & Haulage Hoists
Car Retarders
Hydraulic Car Spotters
Mine Pumps
Mine Blowers
Cold Oil Spray System

SANFORD-DAY IRON WORKS

Automatic Dumping Mine Cars
Rotary Mine Cars
Granby Cars
Man Cars
Precision Bearing Wheels

BROWN-FAYRO AND SANFORD-DAY TO SERVE MINING BETTER

Sanford-Day Iron Works, Knoxville, Tenn.

HOW THE MAIN FRAME CONTRIBUTES TO TOP TRACTOR PERFORMANCE

All-Steel Box A-Frame is a Key to Outstanding, Low-Cost Record of Allis-Chalmers Tractors

Mine operators everywhere are putting new emphasis on shrewd equipment buying. And rightly so. To increase production, stay on schedule and make a profit in the face of today's high costs, they have to be *sure* of getting top value in design, performance and service features.

More and more of these mine operators are now using Allis-Chalmers tractors. One of the big reasons is hidden in the heart of the tractor. It's the exclusive design which characterizes the main frames of all four Allis-Chalmers tractors. These frames are one-piece, all-steel, welded structual members (like the girders in a bridge or the columns in a building). They help provide greater strength and flexibility to withstand shock loads, better equipment mounting, improved weight distribution and outstanding service simplicity.

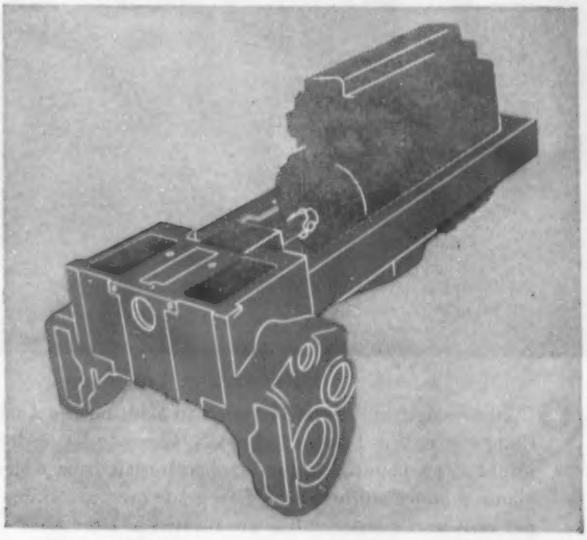
We invite you to see these advantages . . . first at your nearby Allis-Chalmers dealer, and then in a demonstration. Whichever size you may be interested in, you'll see a tractor that is not just modified . . . but designed new-from-the-ground-up to meet the needs of today's jobs.

ALLIS-CHALMERS
TRACTOR DIVISION · MILWAUKEE 1, U. S. A.

"Rolls with the Punch" — The resiliency of the high-tensile steel main frame enables it to flex slightly under extreme shock loads . . . without transmitting the strain to engine, clutch or transmission . . . thus offering extra protection to the complete machine.

Weight Distribution Designed for Today's Jobs— Box A-Frame lets Allis-Chalmers use a modern engine . . . locate main parts for best over-all balance . . . put more weight lower in tractor where it does the most good . . . make the tractor "built to take it."

Better Equipment Mounting — Designed to best serve changing tractor application (today over 70 percent of all tractor equipment is mounted), this compact main frame allows bulldozers to be mounted in close . . . provides ample clearance for equipment like front-end shovels . . . permits wide track shoes . . . improves performance of the entire unit.

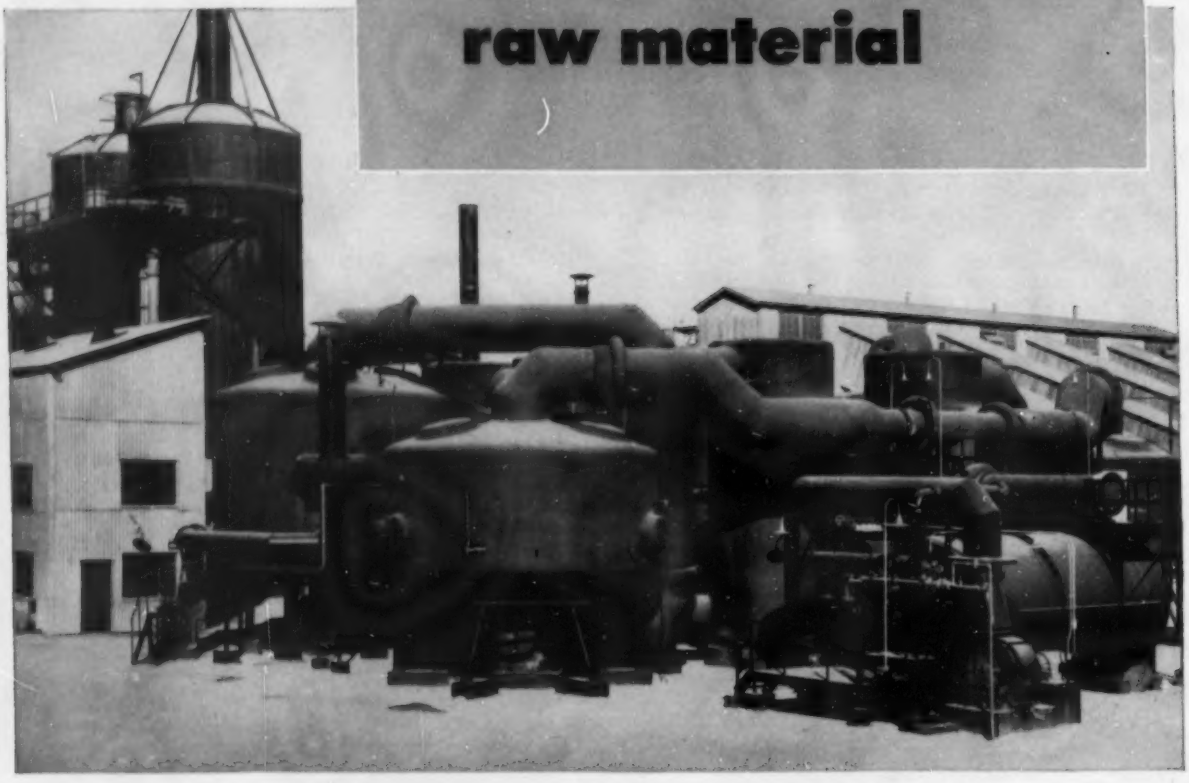


Unit Construction for Service Simplicity — Since the main frame carries the *structural* load, power drive components are designed to do only their specific jobs. They can be readily removed, repaired or replaced without disturbing adjacent parts . . . saving service time . . . actually cutting down time because assemblies can easily be serviced under shop conditions if desired.

HD-20	HD-15	HD-9	HD-5
Weight 41,000 lb Hydraulic Torque Converter Drive 175 net engine hp	Weight 28,000 lb Choice of standard transmission or hydraulic torque converter drive	Weight 18,800 lb 72 drawbar hp	Weight 11,250 lb 40 drawbar hp

Another
CHEMICO
achievement

H_2SO_4 from an unusual raw material



By the completion of the 450 ton-acid plant for the Anaconda Copper Company at Weed Heights, Nevada, Chemico has added another unusual raw material to the list of materials from which Chemico plants produce sulfuric acid. Low grade ores containing 25 to 30 per cent uncombined sulfur are roasted in Dorr FluoSolids reactors to produce strong sulfur dioxide which is cooled, purified and processed into fresh acid of high strength. The plant has unusual features of design that permit it to operate at 150 tons or at 500 tons per day capacity with equal efficiency. • If your problem relates to sulfuric acid manufacture, concentration or recovery, Chemico can help you.

Chemico plants also make H_2SO_4 from these sources

- *Hydrogen Sulfide*
- *Sulfide Ores*
- *Sulfur*
- *Waste Smelter Gases*
- *Sulfur Dioxide*
- *Refinery Acid Sludge*
- *Spent Alkylation Acid*
- *Pickling Liquor*

CHEMICAL CONSTRUCTION CORPORATION

A UNIT OF AMERICAN CYANAMID COMPANY

488 MADISON AVENUE, NEW YORK 22, N. Y.

CABLES: CHEMICONST, NEW YORK

TECHNICAL REPRESENTATIVES: CYANAMID PRODUCTS LTD., LONDON • CHEMICAL CONSTRUCTION (INTER-AMERICAN) LTD., TORONTO • SOUTH AFRICAN CYANAMID (PTY) LTD., JOHANNESBURG

66 871

Chemico plants are profitable investments

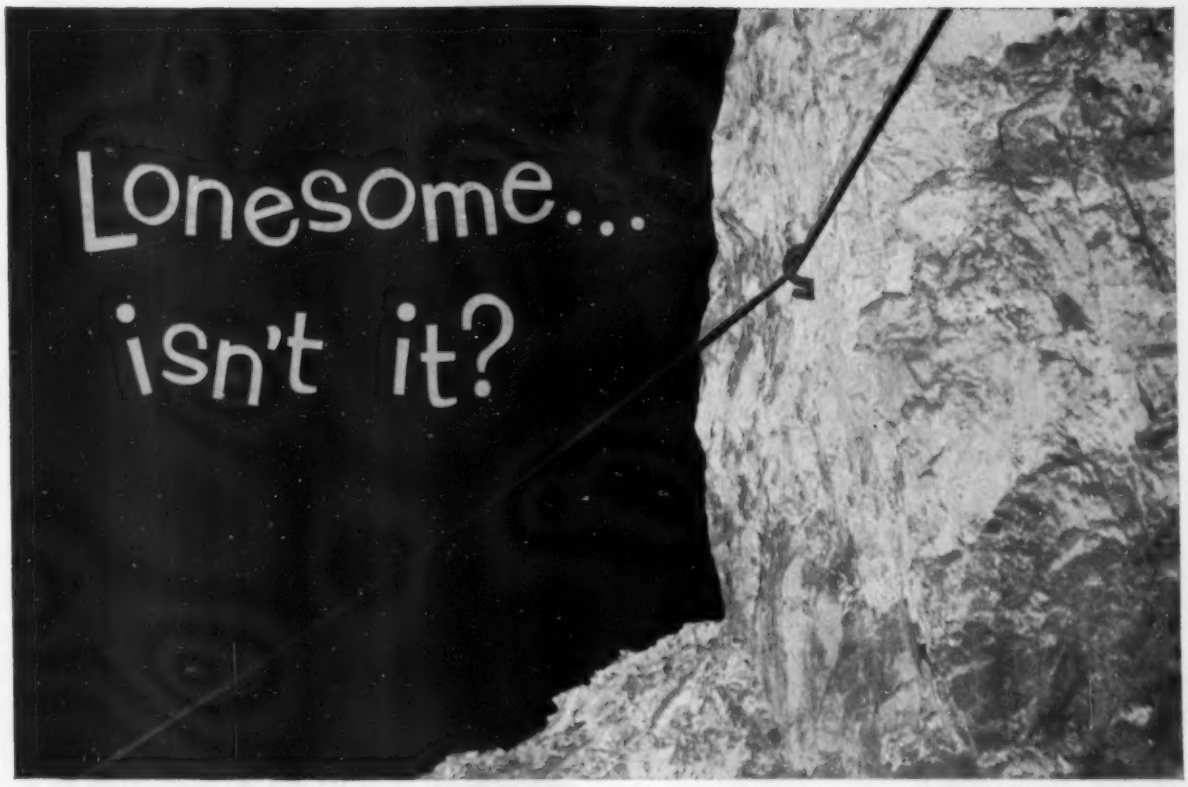


Photo courtesy American Zinc Co. of Tennessee

This Simplex-TIREX Cable carries 250-volt D.C. power to a 25-horsepower slusher hoist 800 feet from the main power line. The cable runs from pillar to pillar and is supported every fifty feet by a cane-shaped hanger wedged into the pillar.

The scraping of many hundreds of tons of ore per day rests upon the consistently satisfactory performance of this lone cable. Here is an operation where "cost cutting" by buying cheap cable simply cannot result in profit. Dependable day-in, day-out operation are primary requisites. Profits rest on it.

Simplex-TIREX Portable Cables are quality cables. They are engineered and manufactured to meet the toughest, most difficult operations that mining affords. They will withstand the blows of falling ore, spalling rock, etc. TIREX Cables were first made more than 35 years ago to meet and overcome the problems peculiar to mining. That's why you will find TIREX wherever you find mining.

Simplex-TIREX Cords and Cables are cured in lead to give you longer service. They are the only cord or cable that have the famous Selenium Neoprene Armor. When you next need a portable cable for slusher hoists, for loading operations, for electric locomotives, or for any other mining service, be sure that you specify and then insist that you get Simplex-TIREX Portable Cables.

Simplex

TIREX CORDS AND CABLES *are made only by the*

SIMPLEX WIRE & CABLE CO., 79 Sidney St., Cambridge 39, Mass.

Expose it to sun and heat...

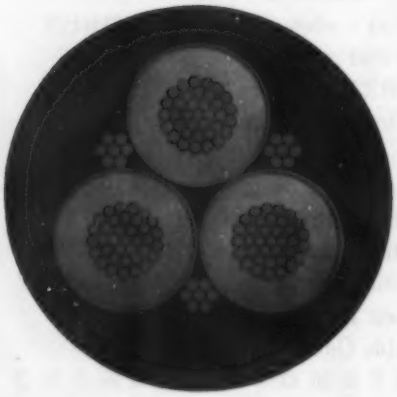
Pull it over rocks and shale...

Trench it in presence of acid water...

Through it all—

Anaconda's tough **MINE POWER CABLE**

keeps power flowing



This easy-to-splice cable is built for heavy duty. It saves you money. It handles well. And it lasts longer — with fewer power interruptions, less maintenance trouble.

Here's why:

BUTYL INSULATION has high dielectric strength . . . superior long-aging characteristics . . . and excellent resistance to moisture, ozone, and heat.

NEOPRENE JACKET is tough . . . has real flexibility and great strength . . . and is resistant to flame and corrosive mine water.

See your nearest Anaconda Sales Office or Distributor for full information about this durable, low-cost Mine Power Cable. Do it today! *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

54549

the right cable for the job

ANACONDA® **WIRE AND CABLE**

—Drifts and Crosscuts—

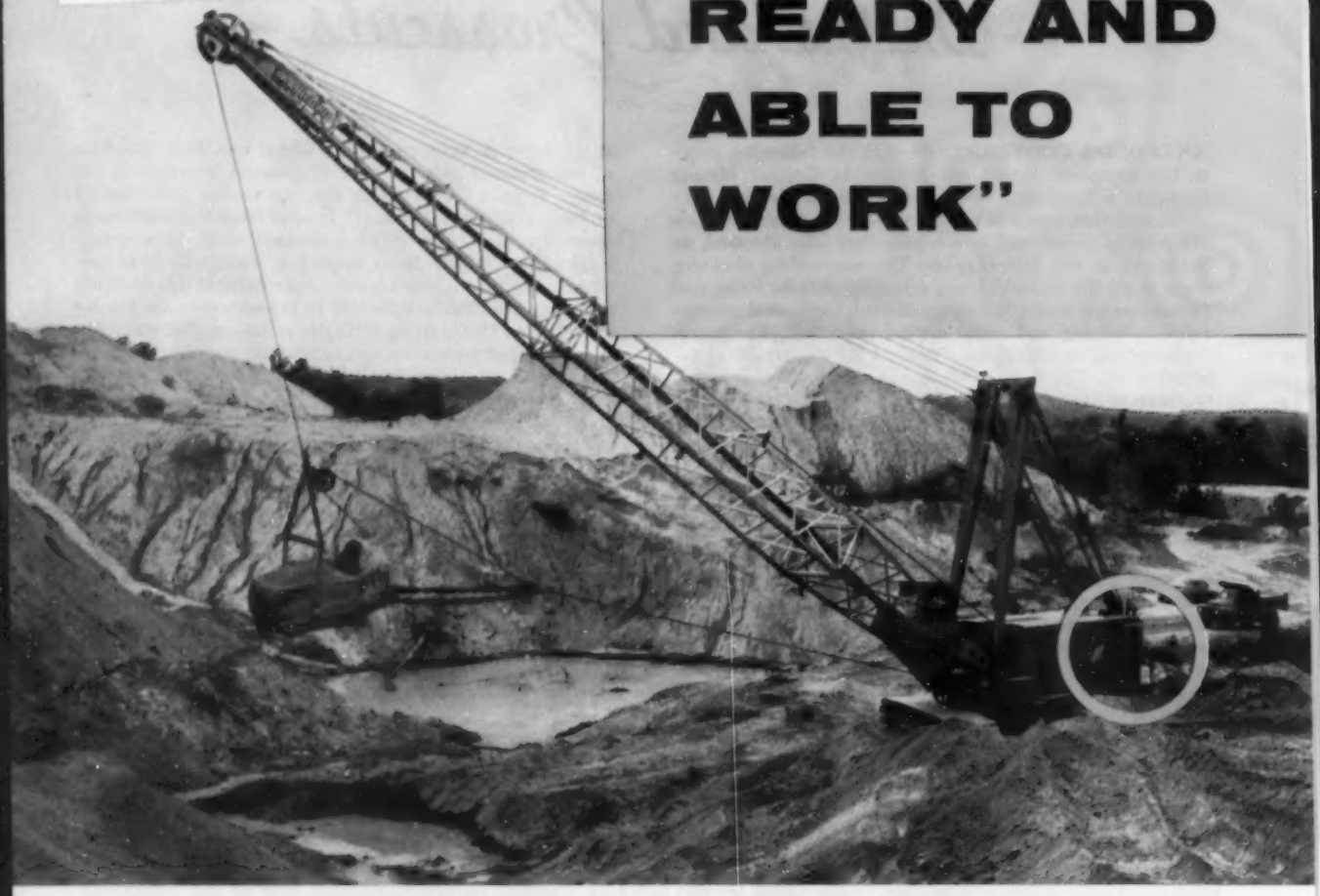
ANACONDA COOPERATION—On the following pages is the complete report on Anaconda Copper Mining Company's Yerington operation at Weed Heights, Nevada, and that name is one of which Anaconda officials are mighty proud and one which they like stressed, as explained in the first chapter. The succeeding chapters contain all the technical and scientific details, facts, and figures which make the operation of such vital importance to mining and metallurgical engineers. The many "mining and metallurgical firsts" at Yerington are of interest to all. The fact that it is copper doesn't mean that the iron or uranium industry doesn't learn more from Yerington than do other copper producers. Fortunately for the entire industry such a report has been made possible by one Anaconda feature—cooperation which is hard to adequately describe. The entire MINING WORLD staff takes this opportunity to thank Anaconda for making this report possible for the good of all. Anaconda cooperation has meant the privilege of seeing and photographing all phases of the operation, the opportunity to discuss pertinent operating details with the Anaconda staff. The courtesy to ask why such and such was done as it was and to receive a detailed answer not only telling why but giving a complete outline of what other methods or approaches had been considered and why they had not been chosen as the best. The man who makes Anaconda cooperation work as efficiently as he does Yerington is general manager A. E. Millar and special thanks are due him for his cooperation and courtesies.

Fission Facts—Uranium is the magic word in the mining industry. The magic word in the country. On the Colorado Plateau, in the chambers of Congress, on the trading floors of the stock exchanges, in the Pentagon, and in the engineering-planning and drafting rooms of the largest industrial concerns. When the final chapter can be written and the facts told new names will be added to the world's great mining districts. To that long and important group of hundreds of million dollar camps, such as the Coeur d'Alenes, Butte, Leadville, Bingham Canyon, Bisbee, the Mother Lode, the Tri-State, the Comstock, and Silver City, to name only a few, will be added new names—names like Big Indian, Long Park, Laguna Reservation, White Canyon, Monument Valley, Section 19, Bull Canyon, Club Mesa, and Poison Canyon. These are the districts where one of the greatest, but least publicized, mining booms in history is taking place. Multi-million dollar ore bodies are common place and it doesn't take much of a hole in the ground to produce a million dollars worth of ore. Not when $50.00 per ton ore can be mined in thicknesses up to 20 feet. Uranium is big business—bigger than most people realize. The hardest job is to find the ore and when you do find it the chances are that it will be high grade. High grade in terms of iron or the base metals. For with uranium the miner gets paid for the "deducts" that normally he pays with other ores. There are no treatment charges, penalties are limited to high lime and while tough for certain ores the United States Atomic Energy Commission and private industry are doing more to open new mills which can treat this type of ore without penalty, and of greatest importance the miner is paid for bringing the ore to the mill instead of having the mill "deduct" freight from his settlement sheet. The milling of the ores, as many as 26 main metallurgical types have been studied to date, will form another most interesting report. Conventional ore dressing practices are closely followed to prepare ores for leaching. New methods using stronger solutions, higher pressures and temperatures, ion exchange, and other inovations are continually being tested. While the separation and recovery of as little as two pounds of U_3O_8 per ton gives much more to work on than 2.0 ounce per ton gold ore the yield is much less than for base metal ores.

"Fission Facts" is a new monthly department of MINING WORLD designed to bring you the uranium highlights of the month. It will vary each month as the atomic picture changes. One month it will be on new discoveries, the next on significant Congressional changes in the Atomic Energy Act. Another time advances in peacetime applications of uranium fuel will be highlighted as will the improvements in metallurgical practices. Watch for "Fission Facts" each month. This month it is on page 75. Don't overlook the fact that uranium is big business—bigger than most people realize—and that it grows every day.

Domestic Stockpile Started—Purchasing of domestically produced lead and zinc under what has been termed the "new look" or long-term defense stockpile was initiated on June 9th when the General Services Administration telegraphed all primary producers and custom smelters for their offerings. One of the provisions of the government request was that all metal must have originated from domestic ore mined after April 1, 1954, that the names of the mines which produced the ore must be listed, and that all deliveries must be completed to the government by August 2, 1954. Details of the tonnages offered and also purchased by the government will be held secret for security reasons. Domestic lead and zinc producers submitted their offers at the existing market prices on June 10th which was final day for the offers. The prices at that time were 14¼ cents per pound for lead and 11 cents for zinc. The government accepted some zinc at that price but the lead offers were rejected with the information "Cannot accept at price quoted". Not surprising is the fact that the lead market broke on June 15th and the price dropped to 14 cents. On June 16, Arthur Flemming, Defense Mobilizer announced that the government would buy lead at 14 cents, and so in effect a floor price has been set for lead at 14 cents and zinc at 11 cents. There is not expected to be a great rush of mine reopenings at these prices. However, it gives mining engineers a chance to sharpen their pencils and see what ore can be mined at a combined price of 25 cents for lead and zinc. The biggest problem for the industry and most vital for the nation will be how much development can be sustained and how much exploration can be started at such a price.

"Our CAT* Diesels are ALWAYS READY AND ABLE TO WORK"



MORE than five years ago, U. S. Pipe and Foundry Co. purchased its first Cat Engine to power a Manitowoc model 300 dragline. Its performance was so impressive that the company now has three more Caterpillar Diesels in draglines, plus two No. 12 Motor Graders and two D7 Tractors with bulldozers.

The original D13000 has more than 11,600 high-production hours to its credit. The dragline pictured here, a Manitowoc 4500, is powered by a big, 400-HP Cat D386. The company's four draglines account for nearly all of its production of 150,000 tons of iron limonite ore annually at this plant at Russellville, Ala.

Long work life is one reason for this company's satisfaction. Such features as specially hardened crankshaft journals, long-lived aluminum alloy bearings, and really *effective* engine filters and seals give Caterpillar Engines many years of high production with low down time. Fuel economy is another cause for owner satisfaction: all Caterpillar Diesels are built to deliver full power, and idle without fouling, on low-cost No. 2 furnace oil, thanks to their exclusive, Caterpillar-built fuel injection systems.

Leading manufacturers can supply Caterpillar power in their draglines, compressors and other mining and excavating machinery. Your Caterpillar Dealer—who offers fast, dependable service and genuine factory parts—will gladly tell you about his Caterpillar Engines and Electric Sets, in 12 sizes, up to 500 HP and 315 KW.

Caterpillar Tractor Co., San Leandro, Cal.; Peoria, Ill., U.S.A.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

SPECIFY CAT POWER FOR HIGH-PROFIT PERFORMANCE

CAPITOL CONCENTRATES

DANGER TO DOMESTIC MINING FEARED IN BARTER PLANNING

There is good reason to believe that the State and Commerce departments have been negotiating with India concerning exchange of agricultural products for manganese. At the same time the Office of Defense Mobilization has not seen fit to rearrange the domestic manganese program, which is scarcely 15 percent completed, so that the maximum purchase authorization of 37,000,000 long ton units of domestic manganese will be assured within the present time limits of the program.

The Indian manganese, of course, is cheaper and the agricultural products are a bothersome surplus. Still, some people believe that our domestic stockpile objective is 6,000,000 tons too low. Domestic manganese is where we can always put our hands on it and the depots at Wenden, Arizona; Deming, New Mexico; Butte and Philipsburg, Montana are quite unsinkable. Perhaps, therefore, we should carry out both programs to the fullest extent, but barter should not be substituted for the small amount of domestic security the present domestic program affords.

• *Mercury Cartel Is Giving Repeat Performance*

The mercury cartel seems to be up to its old tricks. In the face of nearly no domestic production and threats of a war, the price of mercury has advanced some 50 percent since last fall and the metal has become so scarce that the cash price for spot delivery has jumped to $265 per flask. Each time that good prices have induced domestic producers to expand, excessive imports have closed them down again. United States producers have been so badly bitten in the past that only some sort of a long-term program will persuade them to resume substantial production.

• *Tariff Commission Reports To President*

The Tariff Commission has finally reported to the President on the lead and zinc situation. Although such reports are not made public until the President has decided upon his course of action, reliable sources indicate that the commission has recommended tariff increases. White House sources, in turn, indicate that the President will take a dim view of the recommendations. He has 60 days from May 21, 1954, in which to announce his decision.

• *Senator Malone Points Out The Dangers*

Senator George Malone is giving a regular series of weekly talks from the Senate floor to acquaint Congress and the public with the danger of relying on foreign imports for our strategic materials, instead of making an all-out effort to expand sources on the North American continent.

The President's recent mineral policy calls for developing long-range stockpiling from sources as easy of access as the United States itself, but it appears that the Office of Defense Mobilization intends to give the policy the merest sort of lip-service, if any attention at all. As usual, our procurement program is to be centered on purchasing cheap foreign materials and every pound produced under the "high-priced" programs of the Aspinall-Malone bill causes ODM and the Bureau of the Budget exquisite anguish. The domestic mining industry should wake up to the fact that only Congress can give the security which sensible national defense measures require.

• *Russia Enters World Manganese Markets*

The entry of the Soviets into the world manganese market is playing hob with manganese mining in India. With Russian manganese supplying a large part of European demand the price of first-grade Indian ore is reported to have fallen off one-third and mining operations are being curtailed. It would be a neat trick if Russia managed to close down a large number of India's mines, kept our domestic programs at low ebb by waving the banner of cheap manganese at ODM, and then, in keeping with former Russian tricks, pulled the rug out from under us by discontinuing shipments! This has been done before.

• *House Reduced SEC Exemption*

For some reason difficult to understand, the House of Representatives struck out of the new Securities and Exchange Commission bill the provision which would have raised exemptions from $300,000 to $500,000. This provision had White House and industry approval and, therefore, was passed by the Senate. It might possibly be restored to the bill in the Senate-House conference. The matter is of great importance to mining as the $300,000 limitation (raised from $100,000 some years ago by the so-called Vandenburg amendment) has proved to be too low.

• *Silver Users Continue To Lobby*

While the domestic mining industry remains only partly organized and has to crank itself up to meet each new emergency, industrial groups are on the job all the time. The Silver Users Committee, for example, is alertly and continuously chipping away at the Silver Purchase Act. This well-heeled group, headed by retired Rear Admiral Donald J. Ramsey, lobbies night and day for S. 2555 which would wipe silver legislation off the books. The theory seems to be that if the United States production is thrown on the world market the price will be further depressed. Then Eastman Kodak and the flat-ware manufacturers could get their silver a few cents cheaper and make more profits. At any rate, they are willing to pay handsomely for the attempt.

• *Manganese Supply Difficulty Is Cited*

The reluctance of the government to substantially aid the domestic manganese mining industry, when it is known that a lot of manganese must be hauled over from India (1,306,719 short tons in 1953), may be contrasted with the testimony of Brigadier General Fellers (USA Retired). When asked how much we can depend on this source, General Fellers remarked in December 1953, "I am not sure how India would cooperate, and I believe Russia has the capability of destroying the Indian ports and the shipping out of these ports."

1. Planning means cheaper mining.
2. Truck all waste to these dumps.
3. The Yerington open pit mine.
4. Primary and secondary crushing.
5. Oxide copper leached here.
6. Precipitate as cement copper.
7. This is sulphuric acid plant.
8. Sulphur ore mined at Leviathan.
9. Office is the command post.
10. Wood Heights—model townsite.
11. Warehouse stocks acid to wire.
12. Shops can repair it or build it.

Yerington—Anaconda's Latest Contribution to Copper Metallurgy

It is both appropriate and not surprising that Anaconda Copper Mining Company, the world's second largest copper producer, was the first company to equip and bring into production a new United States copper mine following the outbreak of the Korean War.

Furthermore, it is typical of Anaconda's type of operation that at this mine—Yerington at Weed Heights, Nevada—a number of "mining and metallurgical firsts" were achieved. Among these are:

The first company to use rotary drilling exclusively for blast hole drilling in a porphyry copper open-pit mine.

First to develop and operate on a large scale a low-grade sulphur mine in the United States.

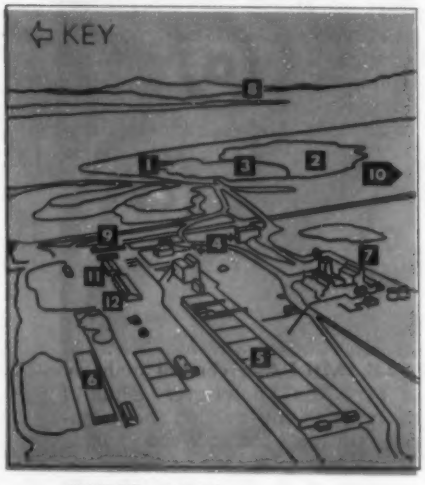
It is the first plant to use agglomeration of fines to coarser particles before leaching so as to make the costly erection and operation of a separate slime leaching plant unnecessary.

First to use trucks for transportation of tailing (leached residue) to disposal area.

Commercial production of sulphuric acid was made for the first time using low grade (25 to 30 percent) sulphur ore as the source of sulphur.

First to dry feed FluoSolids reactors from the top.

Also the first successful bottom discharge of calcine from the reactors.



Another first is a method that has been developed to automatically operate the synchronous motors driving the secondary crushers as induction motors during short overload periods.

Most Important Feature

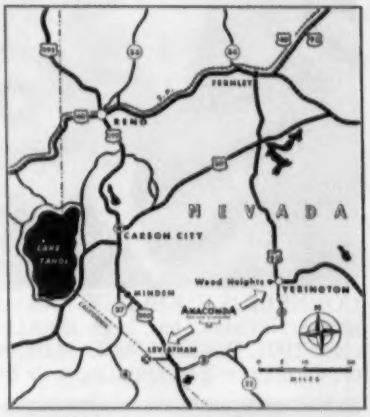
When asked what the most significant thing was about the Yerington project, Mr. A. E. Millar, General Manager, said that the sulphur ore to sulphuric acid was most important. It proved what can be done with a low-grade sulphur source—that the Gulf Coast sulphur deposits have a definite life, and that the sulphur companies should watch what has been done. He predicted a trend toward mining of low-grade sulphur deposits for conversion to sulphuric acid.

Staff Tribute At Dedication

In this successful design, construction, and operation of Yerington an immense amount of planning and study was necessary. During the dedication ceremonies on November 10, 1953 which formally marked the first copper recovery at Yerington, Mr. Clyde E. Weed, Vice President in charge of all Anaconda operations, paid tribute to the men who had accomplished so much when he said:

"I have gone into considerable detail to show the ability and experience of the many men needed to carry through this project to a successful conclusion. Fortunately the Anaconda Copper Mining Company has attracted to its staff during its many years of life just the type of men demanded by this work. I am very happy to be a member of this family."

Anaconda is very fortunate to have Mr. Weed as a member of its family for he is responsible for Yerington, perhaps more than any other man. He was instrumental in securing the approval of the Anaconda Board of Directors for the project and in expediting plant construction. Today Mr. Weed continues his great personal interest in Yerington. Weed Heights, of course, was named after



Mr. Weed by Mr. A. E. Millar, General Manager. In acknowledging this tribute, Mr. Weed said "I was very much honored and pleased when it was decided to name the townsite after me. Very few men receive an honor such as this while they are still alive and I deeply appreciate it."

Government Requests Copper

Shortly after the start of the Korean War the Federal Government was concerned about adequate supplies of copper and through its agencies asked Anaconda if the company had any undeveloped properties that could be brought into production. Yerington had been held in reserve by the company and at the government's request immediate plans were made to bring the property into production. When Anaconda agreed to the request, Mr. Cornelius F. Kelly, Chairman of the Board, insisted that all of the funds necessary for the project be supplied by Anaconda. That has been the case and all of the $34,879,360 expended at Yerington through January 31, 1953 were company funds.

In November 1951 Anaconda signed a contract with the Federal Government to bring the Yerington oxide ore body into production (35,000,000 tons of 0.97 percent oxide copper underlain by 15,000,000 tons of similar grade sulphide ore).

CORNELIUS F. KELLEY, chairman of the board and native Navadan, has been associated with Anaconda since 1901. President for 22 years, he insisted that Anaconda finance Yerington from its own company funds.

. . . Important mines and important companies are made by men. Anaconda's men have made Yerington the greatest copper story of the year.

ROBERT E. DWYER, president, has been with Anaconda for 51 years. Besides his presidential duties, he holds top positions with many of the firm's affiliate companies.

CLYDE E. WEED, vice president in charge of operations, was directly responsible for getting the Yerington project approved and still maintains keen interest in it.

EDWARD S. McGLONE, executive vice president, has held numerous engineering posts in his 30 years at Butte. His offices are now at the New York headquarters.

RICHARD S. NEWLIN, vice president, began his Anaconda career as a mining engineer in 1922. He is president of the subsidiary Inspiration Consolidated Copper Co.

CHESTER H. STEELE, vice president in charge of western operations, is both a competent geologist and administrator. He has held his present post since 1952.

A. E. MILLAR, general manager at Yerington, knows every detail of the project's construction and operation. He has been at Weed Heights since work began in 1951.

Due to the world-wide shortage of elemental sulphur at this time the government also requested that Anaconda develop its own sulphur supply. Anaconda did by bringing into production the Leviathan sulphur mine and constructing a plant to produce sulphuric acid from this mine's ore.

Production Starts On Schedule

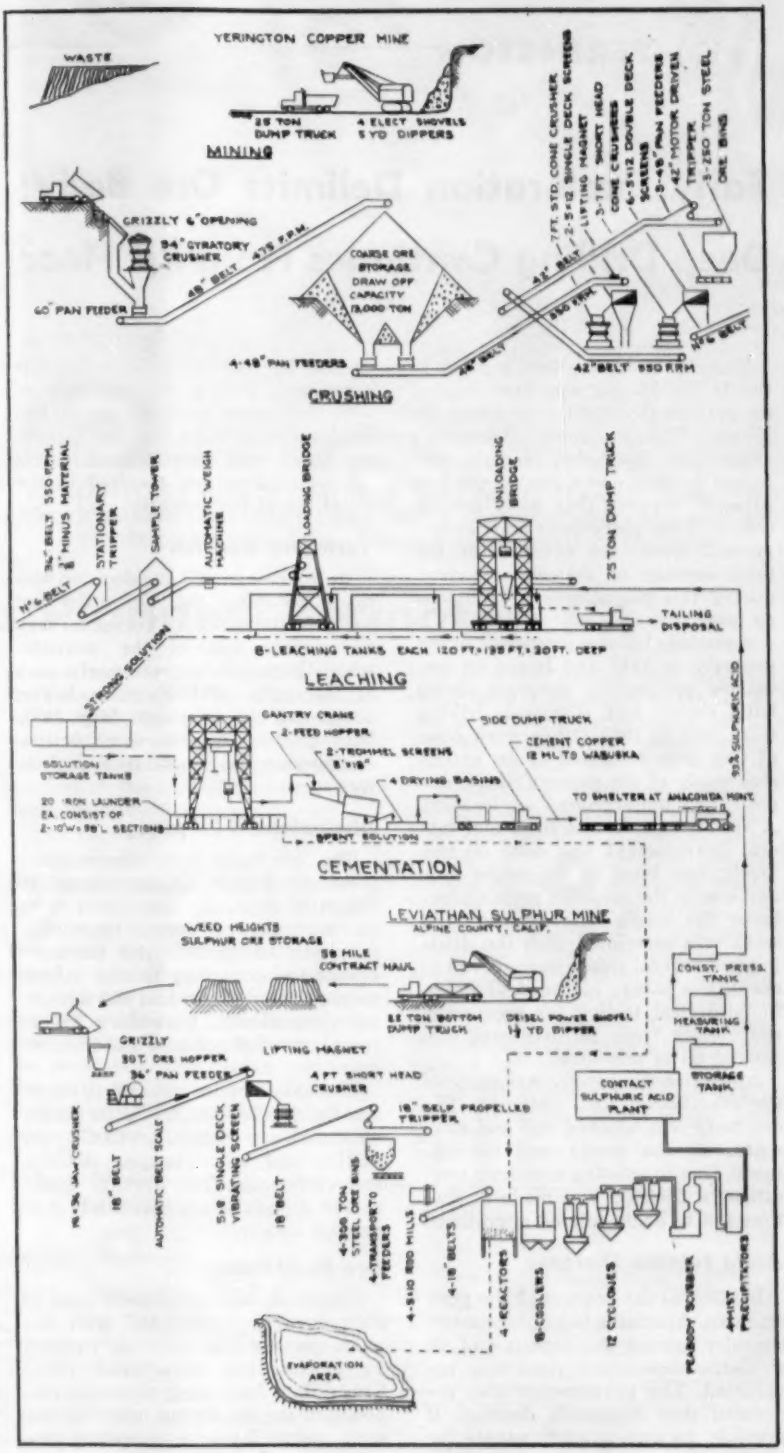
Anaconda announced at the same time that the plant would be in production in 1953. It was, too, with the first cement copper shipped in November 1953. Among other things, by December 31st of 1953 this necessitated the stripping of 18,028,-261 tons of overburden (6,976,000 in 1952), 1,850,806 tons of plant grade ore mined and stockpiled, and delivery of 331,550 tons of ore to the plant. The plant was completed necessitating excavation of 163,000 cubic yards of material, pouring of 51,000 cubic yards of concrete reinforced with 4,020 tons of steel, erection of 4,200 tons of structural steel, and stretching of 3,000 miles of plant electrical wires.

General contractor for plant construction was J. A. McNeil Company of Alhambra, California. Other contractors included Vinnell Corporation (Steel Division), Los Angeles, California; Newberry Electrical Corporation, Los Angeles; Chemical Construction Corporation, New York, New York; The Dorr Company Egnineers, Stamford, Connecticut; Heyl and Patterson, Pittsburgh, Pennsylvania; and Wiechmann & Probasco, Inc., Reno, Nevada. Isbell Construction Company of Reno strips overburden at the Leviathan mine under contract and Wells Cargo, Inc., also of Reno, hauls sulphur ore to Weed Heights.

Hope Of Copper For Peace

At the plant dedication, Mr. Robbert E. Dwyer, President of Anaconda, said "There is no apparent reason why the demand for copper should not grow with the growth of the country and the electrical and other industries. Copper is not only an absolutely essential metal in time of war or national emergency, but it is an essential metal in time of peace. We earnestly hope that the copper produced from Yerington will be employed in the years to come in peaceful pursuits rather than in instruments of war."

Mr. Dwyer and Yerington can have no greater hope. The mining industry wholeheartedly joins in this hope.



Schematic Flowsheet
Yerington Mine Operations

Anaconda Copper Mining Company
Weed Heights, Nevada

YERINGTON

Early Exploration Delimits Ore Body; Deep Drilling Continues From Pit Floor

The ore body was first located in the 1870's. Mining was then carried on periodically until 1930 when the Mason Valley Mines Company's smelter at Wabuska, Nevada was forced to shut down due to the low price of copper. This early mining was of both glory-hole and underground work. An estimate of the total amount of material removed during this period was 100,000 tons or less.

Anaconda became interested in the property in 1942 and began an extensive prospecting program, doing both churn and diamond drilling from 1942 to 1945. Other work done at this time consisted of an extensive study of the geology of the deposit, and underground exploration. A 400-foot shaft was sunk and lateral development was done on two levels; one level in the oxide zone and one in the sulphide zone underlying the oxide. The underground work was correlated with the drilling and several raises were driven to check the assays of the drill holes. Metallurgical testing for recovering the copper from its ores was also carried on at this time.

An engineering study was made of the exploration data obtained. The ore body was blocked out and estimates of the grade and tonnage made. Due to existing economic conditions a decision was made at that time not to begin mining operations.

Acute Sulphur Shortage

In 1950, at the request of the government, Anaconda began to actively consider mining the deposit and all available exploration data was revaluated. The government also requested that Anaconda develop, if possible, its own sulphur supply for leaching the oxide ore because of the acute shortage of elemental sulphur at that time.

Anaconda engineers studied all available supplies of sulphur. A deposit only 58 miles from Yerington at Leviathan in Alpine County, California was located. An option was obtained on this deposit which was owned by the Texas Gulf Sulphur Company. During the summer of 1951 additional geologic study and exploration drilling on the deposit, combined with metallurgical testing of the sulphur ore, resulted in the purchase of the property.

Yerington Decision

In November 1951 the decision was made to mine the Yerington ore body. Initial work at Yerington was the construction of the townsite which began during the early part of December 1951. Families began occupying the homes in May 1952. During the townsite construction, engineering for the mines and plant was carried on.

Disseminated Porphyry

The ore body is a disseminated porphyry deposit. Copper mineralization is generally associated with an intrusion of quartz monzonite porphyry into granodiorite, the mineralization occurring in the quartz monzonite porphyry and the adjoining granodiorite. Secondary intrusions consist of andesite and rhyolite dikes.

The chief copper mineral is chrysocolla ($CuSiO_3 \cdot 2H_2O$) with minor amounts of malachite $CuCO_3 \cdot Cu(OH)_2$ and other copper silicates and carbonates. The average grade of the deposit is approximately 0.95 percent copper.

Ore Body Differs

The secondary enrichment zone is only vaguely represented with the oxide passing into sulphide without an intermediate enrichment zone. This differs from most porphyry deposits of the Southwest wherein the main values lay in a secondary enrichment zone.

The ore occurs in smaller masses than is general in porphyry copper deposits. Much of it is found in bands which generally dip to the north, conforming to the structural trend of the ore body. As the ore is interspaced with waste close grade control with selective mining is necessary.

The entire pit area, including both oxide and sulphide ore bodies, is approximately 1,800 feet in width, 4,500 feet in length, and has a maximum thickness of 450 feet. Most of the deposit is overlaid with gravel. The gravel-bedrock contact dips to the west with the gravel thickness varying from 0 to 200 feet.

Raises Mined on Drill Holes

The exploration program carried on from 1942 to 1945 was under the direction of Alex M. McDonald of the Anaconda exploration staff. Surface prospect drilling done during that period consisted of approximately 150 holes. These were churn drill, diamond drill, and combination churn and diamond drill holes drilled vertically on 200-foot centers. Underground work during the same period was done on what will be the 4,275 and the 4,125 benches in the pit (bench numbers are elevations in feet above sea level). This underground work consisted of 1,200 lateral feet on each level, plus several raises mined on drill holes. All of the underground material removed was sampled and assayed, channel samples of workings were also taken.

Drilling Done in Stages

To gain additional information about the deposit churn drilling on a 100-foot grid within the previous drilled 200-foot grid began in December 1952. At the start of this drilling an arbitrary bottom of 4,300 feet was set so as to enable the necessary drilling to be completed in time (ahead of mining).

By drilling holes to this depth instead of through the total thickness of the ore body it was estimated that the necessary drilling could be accomplished with two churn drills. It was also determined that this depth was a much more economical drilling depth because of the increased time required for bailing the cuttings and the increased amount of casing necessary in a deeper hole. The drills used are mounted on crawler tracks, so that moving and setting-up takes only a short time. This drilling has been completed to the 4,300 elevation and is now being continued to obtain more information between elevation 4,300 and 4,200. Samples of the drill cuttings for assaying are taken every five feet. These assays are then weighted to obtain one assay for each 25-foot bench.

Geologic mapping in the pit is being carried on as mining progresses. This work is under the direction of James R. Wilson of the Anaconda exploration department.

—YERINGTON

YERINGTON OPEN PIT MINE showing two of the four 5-cubic yard electric shovels, two rotary blast hole drills, one exploration churn drill, and a powder crew loading a round on the bench between the two shovels.

How Anaconda Planned Yerington Pit

When the Anaconda Copper Mining Company decided to bring the Yerington porphyry ore body at Weed Heights, Nevada into production one of the first projects was pit planning. Maps showing ore and waste with tonnages and grades were the key. Both longitudinal and cross sections are 100 scale, on 200-foot intervals to show the distribution of ore, waste, and assay data. The pit outline was then determined by the grades and tonnages of ore, waste stripping ratios, and estimated mining costs.

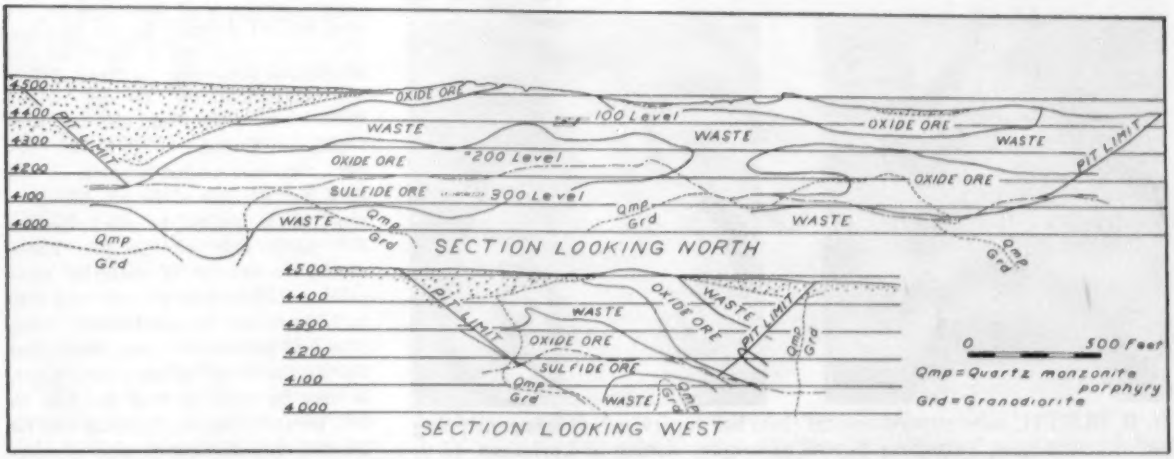
One of the things which affected the mining plan was the desirability of removing overburden and waste to expose as much ore as possible before actual ore mining commenced. It was necessary to accomplish this by November 1953, when the plant began operation requiring a continuous 11,000 dry tons of ore daily per calendar day. The average moisture content of the material as mined is approximately four percent.

Pit Specifications

There were numerous approaches and many modifications to the proposed mining plan before determining that now being used. Two main haulage roads lead into the pit, one from the north side and one from the south side. The haulage road on the north side leads to the crushing station or to low-grade stockpiles, while the one on the south side leads to the waste dumps. All haulage roads have a minimum width of 40 feet, a minimum curve radius of 150 feet, and a maximum grade of 8.0 percent.

The original mining plan was to use 50-foot-high benches. This was later changed to a 25-foot bench to provide a more selective mining method as the ore grades to waste both vertically and horizontally. By using a 25-foot bench an additional advantage is that the shovels can reach the entire face and thereby perform safer mining. This is especially advantageous in removing the gravel overburden which is not blasted.

The pit is being mined on a 1:1 slope. The overall waste to ore ratio is 1.7:1.



TYPICAL GEOLOGIC cross sections of the Yerington ore body and pit limits.

YERINGTON

ROTARY BLAST HOLE DRILLING started in December 1952 and has proved so successful that all blast hole drilling in the Yerington pit is done by this method.

Truck Pit Permits Selective Mining Using Rotary Blast Hole Drilling

The selection of mining equipment was based on experience at other properties applied to the existing conditions at the Yerington ore body. Mining equipment was purchased shortly after the decision was made to mine the ore body; delivery was specified for June 1952. Stripping operations began in June 1952 immediately after receiving the first equipment. By the first of November 1953, 18,000,000 tons of waste and 1,700,000 tons of ore (plus-0.60-percent copper) had been mined. The ore was stockpiled awaiting the completion of the plant.

H. R. BURCH, mine superintendent (left) has supervised all waste stripping and ore mining at Yerington as well as sulphur mining at Leviathan. C. J. HOUCK shown at right is general pit foreman.

Extremely selective mining is being carried on. All plus 0.60 percent copper material is classified as ore and hauled directly to the crusher. The waste and ore is removed and stockpiled according to three different classifications. Gravel which contains no copper and also any material containing less than 0.20 percent copper is hauled to waste dumps on the south side of the pit. All other material is hauled to stockpiles on the north side of the pit. These stockpiles consist of material containing 0.20 to 0.40 percent and 0.40 to 0.60 percent copper. Initially some plus 0.60 percent ore was stockpiled during the construction of the plant. It may be possible that the 0.40 to 0.60 percent copper stockpile can be treated upon the completion of mining the oxide ore body. Recovering

the copper from the 0.20 to 0.40 stockpile could be by heap leaching.

Blast Holes—Rotary Drilled

Most of the gravel overburden was and is being removed without blasting. Initial blast hole drilling was with churn drills, drilling a 9-inch hole. In December 1952 a track-mounted rotary drill was purchased. Using a tri-cone 7⅞-inch bit it drills approximately an 8-inch hole. Up to April 1954 this drill averaged 261 feet per shift. Average bit life was 3,896 feet. All blast hole drilling is now done with this machine. An added advantage of this drill is its attached sampler which exhausts the dry cuttings from the hole and splits them, saving a sample for assaying.

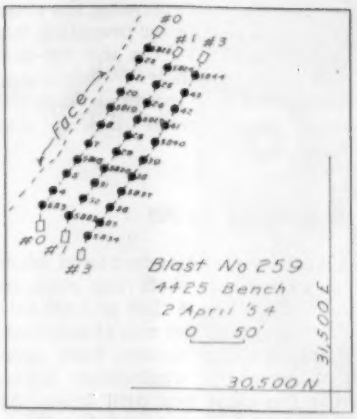
The drilling and blasting pattern varies with the type of ground. An average drilling and blasting round is shown in the accompanying figure. The engineering staff stakes out holes by chaining. The distance between holes and also the depth of each hole is varied by the engineers, depending upon the hardness of the ground. Average distance between holes is 18 feet, and 25 feet between rows of holes. The holes are drilled approximately 30 feet deep, 5 feet below the level of the bench.

Breakage Is Good

Holes are loaded according to the hardness of the ground as shown in the drill operators logs. Three 4- by 8-inch sticks of 60 percent dynamite are used as a primer. Free flowing 40 percent dynamite is used for the remainder of the charge. On an average this amounts to about 175 pounds of powder per hole. The remainder of the hole is stemmed with rotary drill cuttings which make an ideal stemming material requiring no tamping. About 20 feet of each hole is stemmed, or a few feet more than the shortest distance to other holes, so as to keep the stemming from being blown out of the hole during the beginning of the blast thereby losing the value of stemming.

Holes are fired with Primacord. This in turn is set off by nine and 17 millisecond-delay electric blasting caps, using MS connectors. The electric blasting caps are set off by a hand detonator.

Breakage is exceptionally good, requiring practically no secondary blasting. An idea of the nature of the material can be obtained from the fact that an average of 8.6 tons are broken per pound of powder.



DRILLING AND BLASTING PATTERN for a typical blast showing individual hole numbers and firing order.

All blasting is done on the day shift by a crew composed of a foreman and four powder men.

7,110 Tons Per Shovel Shift

Loading is done with 5-cubic-yard electric shovels using solid tooth buckets. Four of these shovels are in use, two or three used at a time on any one shift. By having four shovels selective mining is carried out more easily; the shovels move only short distances to and from working faces. A bulldozer is used in conjunction with each operating shovel for clean-up. Average tonnage loaded per shovel shift is 7,110 tons or about 1,000 tons per operating hour.

Haulage is provided with 25-ton rear dump trucks powered with 300-horsepower Diesel engines driving through torque converters. The torque converters enable the trucks to drive to and from the waste dump, low-grade stockpiles, and the crusher station in third gear, requiring shifting only for backing-up. Six to eight trucks are assigned to each shovel depending upon the length of haul. The maximum haul is 0.8 miles. All load hauls are on adverse grade.

A man at each shovel spots the trucks for the shovel operator, so that as short a swing as possible is maintained; this is 90° or less. Four passes by the shovel are needed to load a truck. Truck spotters are also used at the waste dump and low-grade stockpiles to aid the drivers. Bulldozers are used to level off the dumping areas. Portable gasoline-powered generators provide lighting for these dump areas during the evening shift. A motor blade and water truck are used to keep the mine roads smooth and well packed.

Engineering Control

Engineering control is based on a triangulation system which covers the entire mine, plant, and townsite area. A secondary set of triangulation stations is laid out on each bench. Closed level circuits are run to these stations and the station is advanced as the mining progresses. From these stations drill holes are surveyed daily by transit and stadia. After each shift of mining the brow of the bench is shot in by stadia. Drill holes and the brow are then

LOADING ORE with a 5-yard electric shovel in the Yerington open pit mine. Note the bulldozer used to clean up spill from the truck. The 25-foot high bench is clearly visible behind the shovel.

SAMPLE AND EXPLORATION holes are drilled on a 100-foot grid by churn drills using a 9-inch bit.

plotted on the bench plan map. Drill hole assays are also plotted on these maps. Calculations are made of the quantity and grade of ore from these blast drill hole assays and from previous exploration drill holes. From this data the succeeding shifts of mining are planned .

A set of sheets and maps comprising the daily mining plan are given to the pit foreman. This tells him the locations of ore and waste to be loaded, amount, and estimated grade.

Those areas in the pit to be drilled for blasting are determined from a monthly plan map. Each month a plan map of the pit is drawn up for the coming month showing the areas to be mined. Data for preparing this map is obtained from the 100-foot grid exploration holes. Another map is prepared each month showing the exact areas mined during that month.

Dewatering the Pit

Water was first encountered when the exploration shaft was sunk in the early 1940's. A flow of 2,400 gallons per minute was met at this time. Water-elevation records have been kept since the exploration began from the shaft and drill holes. At the time stripping started the water level was at an elevation of 4,380 feet. The plan for providing a water supply for the plant and townsite, and for dewatering was to drill wells just outside the periphery of the ore body. The first step in the dewatering program was to drill 12-, 14- and 18-inch holes and to install test pumps to further determine where the water was coming from and probable amounts. To date five wells have been drilled and pumps installed.

Automatic Pumping System

Information is continuously being compiled from the present water wells and also from surrounding open prospect holes in order to determine the lowering of the water level in the area. From this information it has been determined where the main water sources are and also where it will be necessary to drill additional wells as the mining progresses to lower elevations. Estimates have been made of the quantity of water that it will be necessary to pump. At the present time a total of 2,500 gallons per minute are being pumped; most of this is used at the plant or for domestic purposes. Any excess water over that required by the plant and for domestic purposes is returned directly to the Walker River. Water is pumped from the wells to a reservoir located near the pit; from here it is pumped to townsite and plant storage tanks.

The water pumping system is entirely automatic with controls between storage tanks and the pumping reservoir. That is to say, the pumps automatically start when a certain level has been reached in the storage tanks, and the pumps again are automatically taken off the line when a certain top level has been reached.

Mining Statistics
Yerington Mine
Weed Heights, Nevada
May 18, 1954

Churn Drilling	
Bucyrus Erie—42-T	
Prospect Drilling	
Feet drilled per churn drill shift	40
Feet drilled per bit change	43
Blast Hole Drilling	
Feet drilled per churn drill shift	54
Feet per bit change	57
Rotary Drilling	
Joy—58 BH	
Prospect Drilling	
Feet drilled per rotary drill shift	227
Feet per bit	3,780
Blast Hole Drilling	
Feet drilled per rotary drill shift	262
Feet per bit	3,780
Rock Breaking	
Tons broken per pound of powder	8.45
Tons broken per foot of hole	62.30
Shovel Loading	
P&H—Model 1500	
Tons loaded per shovel shift	7,110
Truck Haulage	
Dart Model 140—25 Ton, 300 HP engine	
Tons hauled per truck trip	25
Tons hauled per truck shift	1,033

SPOTTING A 25-TON truck for dumping its load of low grade ore over the bank of one of the stockpiles. Trucks are used interchangeably for hauling ore to crusher, low grade to stockpiles, and waste to dumps.

YERINGTON

Plug-Clearing Gyratory, Fast Belt Conveyors Mean Speed, Efficiency In Three-Stage Crushing

TRUCKS DUMP into primary gyratory crusher as shown in upper picture. Top of the 54-inch gyratory and manganese steel grizzly with 4-inch openings are shown in lower picture.

The crushing plant at Yerington is designed to reduce more than 11,000 dry tons of copper-oxide ore to minus-⅜-inch in size per day. It was designed by the New York Engineering Office of Anaconda, headed by Wilbur Jurden, chief engineer.

A. J. GOULD, metallurgical plant superintendent, has a wide background of copper leaching at Inspiration.

A wealth of experience went into the Yerington project. The New York office had designed several beneficiation plants in the United States, and also Chile Exploration Company's Chuquicamata leaching & sulphide plants in Chile. This backlog of experience helped make the Yerington plant the most modern of its kind in the world.

Primary Crusher

Run-of-pit ore is dumped over a grizzly at the primary crushing plant. The grizzly, made of 12-inch manganese steel bars, has 4-inch openings. Oversize goes to a 54-inch gyratory crusher set for 3¼ inches. Undersize from the grizzly and the crushed material drop into a receiving pocket with a capacity of 150 tons. This pocket serves an important function. It allows the gyratory crusher to clear itself of contained ore whenever the feeder or conveyor below the pocket stop operating for any reason. The crusher is not directly connected to the feeder and conveyor interlock system. Whenever the other components cease operation, the interlock, instead of stopping the crusher, actuates a warning horn to alert the crusher operator.

Rocking Clears Plugs

The 400-horsepower induction motor for the gyratory crusher has two complete control cubicals—one for forward motion and one for reverse. Whenever the crusher is plugged, the motor goes off the line on overload. It is then possible to rock the crusher using the two controls. The forward and reverse rocking action helps clear the plug.

Spare parts for the gyratory are kept on hand in the primary crusher house. Immediately below the gyratory eccentric is a built-in hydraulic jack with flow control and a 4-way operating valve. When not in use, the

COARSE ORE STORAGE stockpile shown at top has a draw-off capacity of 11,000 tons permitting 6-day mine operations for 7-day secondary crushing. Secondary crushing plant is shown in the lower picture.

jack is recessed into the concrete floor under the eccentric.

Two rails are set in the concrete floor for a special truck. Whenever it becomes necesary to pull the eccentric, the jack will lower it to the truck which, in turn, can then be pulled out from under the crusher. A 60-ton traveling crane in the crusher house will trade the spare eccentric for the used one on the truck. Then the jack will lift the spare back into place.

Coarse Ore Storage

A 60-inch pan feeder below the crusher pocket transfers the ore to conveyor No. 1. This belt rises 110 feet on a 15° incline to the top of the coarse ore storage. This has a live storage of 11,000 tons which permits the primary crusher to operate at all times in conjunction with the mining operation. It holds enough ore so that a 6-day mine operation will furnish a 7-day ore supply to the secondary crushing plant.

The coarse ore storage is of semi-open construction. The four sides have arched openings and permit the ore to swell out past the sides of the bin. Periodically the ore is dressed down by a dozer.

This type of construction was preferred for two reasons. It is the minimum size building for a 11,000-ton storage capacity, and it required a minimum of excavation and concrete for chutes to the pan feeders under the bin.

Secondary Crushing Plant

Four 48-inch pan feeders under the coarse ore storage feed conveyor No. 2. From there the material is transported over a recording weightometer and under a tramp iron magnet to the secondary crushing plant and two 5-by 12-foot double-deck screens. The top deck is a one-inch rod screen with 1½-inch slotted openings. Slotted screen cloth with 5/16-by 4¼-inch openings is used for the bottom deck.

Table No. I
CRUSHING PLANT CONVEYOR SIZES AND SPEEDS*

Belt No.	*Belt Width in Inches*	*Horizontal Distance of Belt in Feet*	*Belt Speed in Feet per Minute*
1	48	512	475
2	48	476	350
3	42	309	550
4	42	37	550
5	42	326	550
6	36	201	550
7	36	1,316	550

* Plant capacity based on 1,000 dry tons per hour.

The oversize from the top deck goes to a 7-foot standard cone crusher set at 1⅛ inches and operating in open circuit. The plus 5/16- and minus-1½-inch material bypasses the crusher and goes to conveyor No. 3 which carries the circulating load. Number 6 conveyor picks up the minus-5/16-inch material from the bottom deck of the screen. (Finished product is carried by No. 6 conveyor)

Discharge product from the standard cone crusher goes to No. 3 conveyor and is transported to the junction house. 150 percent circulating load is being carried at the present time.

At the junction house the direction of ore flow is reversed. Number 4 conveyor transfers the material from No. 3 to No. 5. Number 5 conveyor carries the circulating load to the top of the secondary crushing plant. Here a motor-driven tripper drops the ore into one of three steel bins.

Below each of the three steel bins is a 48-inch pan feeder. These three feeders are followed by six (two for each feeder) 5- by 12-foot double-deck finishing screens. The top deck is a ⅞-inch square screen cloth. Minus-3.8-inch material goes directly to No. 6 conveyor. Oversize from both decks of the six screens is fed to three 7-foot short head cone crushers operating in closed circuit. The crushers are set for 5/16 inch and discharge is returned to the circulating load on No. 3 conveyor.

Conveying to Leaching Vats

The final product, all minus-⅜-inch, is loaded on conveyor No. 6 through eight chutes from the finishing screens. Water sprays follow six of these chutes for the agglomeration of the fines.

At the sampling tower the ore is dropped from No. 6 conveyor to No. 7. The ore stream is sampled every six minutes by a cutting bucket that travels in a full circle through the stream as it drops to No. 7 conveyor. The bucket is automatically dumped over cutters so that the original 3,-200 pounds is reduced to approximately a 400-pound sample. The samples are carefully further cut and reduced by hand. Number 7 conveyor then carries the ore over a recording weightometer alongside the leaching vats to the loading bridge.

In designing the conveyor system for the crushing plants, the trend was toward narrow and fast belts. The belt speeds at Yerington are exceptionally fast. Average speed for the seven conveyor belts is 510 feet per minute, which is above the normal standard for mill design.

From the primary crusher, the ore is conveyed over 3,000 feet (horizontal distance) to the leaching vats. The ore travels through the plant almost 6 miles per hour. Table No. 1 gives the width, horizontal distance traveled, and speed for each of the seven belts in the crushing plant.

Collectors Control Dust

Cyclone dust collectors are used for dust control in all sections of the crushing plant. Starting with the gyratory crushing chamber, the cyclones are connected to the pan feeders and cone crushers throughout the plant. All dust is reclaimed to the conveyor belts.

Eight dust collecting systems are employed for the crushing cycle. In the primary crusher house, there is a twin cyclone collector with a 45,000-cubic-feet-per-minute fan. One cyclone with a 12,000-cubic-feet-per-minute fan handles the dust for the four pan feeders under the coarse ore storage bin. In the junction house, one cyclone with an 8,000-cubic-feet-per-minute fan collects the dust.

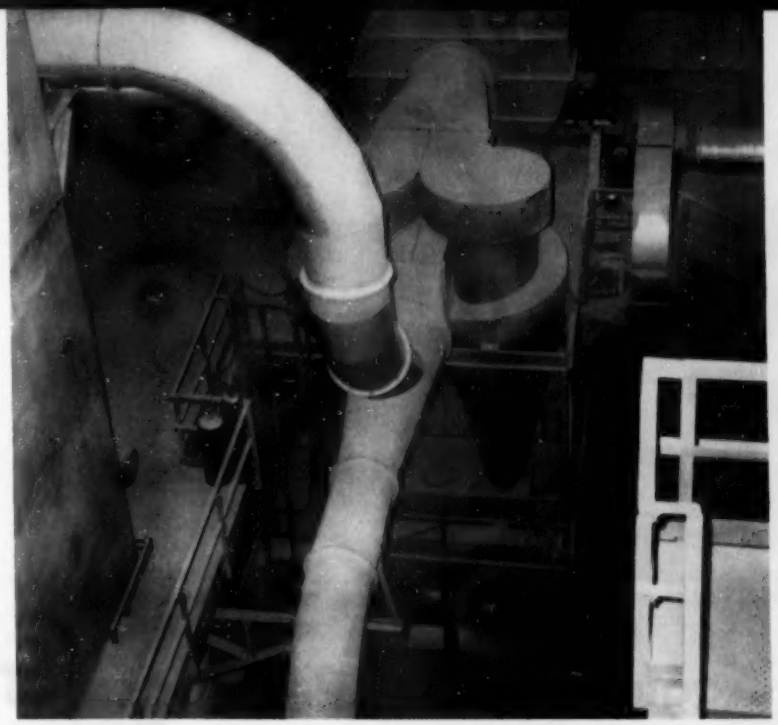
The secondary crushing system employs one system with a cyclone and a 12,000-cubic-feet-per-minute fan and three systems, each with one cyclone and a 15,000-cubic-feet-per-minute fan. The final system is in the sampling tower, and consists of one small cyclone and a 4,000-cubic-feet-per-minute fan.

Crusher Lubrication

The gyratory crusher is lubricated by a circulating oil system. Oil is pumped to the crusher from a 2,000-gallon oil storage tank at the rate of 30 gallons per minute and returns to the tank by gravity flow. A pressure oil filter cleans the oil from storage and returns it to the tank. There is an oil heat exchange unit which controls the temperature of the oil going to the gyratory crusher.

The spider for the gyratory crusher is lubricated by a separate system. Oil from a 140-gallon storage tank is force-fed directly to the spider at the rate of one-half gallon per hour.

The secondary crushers can be lubricated by one of two methods, either gravity feed from the head tanks or by direct circulation from the oil pumps. The two oil head tanks hold 1,600 gallons each, and there are two oil storage tanks with a capacity of 3,400 gallons each.

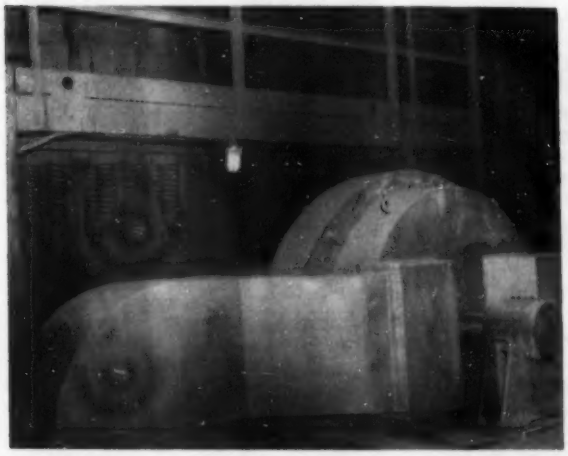


TWIN CYCLONE dust collectors in the primary crushing plant reclaim dust from the gyratory crusher and the pan feeder to the No. 1 conveyor. Cyclones are mounted in pit adjacent to gyratory.

Minimum Crew Required

The crushing plant at Yerington operates with a minimum of personnel. Three men are required for primary crushing and the coarse ore storage operation. Eight men operate the secondary crushing plant, sampling tower, and final transportation of the ore to the leaching tanks.

The primary crushing plant operates two shifts per day for six days a week. The secondary crushing plant operates about 13 hours per day, six days a week.



EIGHT SECOND RELAY allows the synchronous motor at left to operate as an induction motor long enough to clear minor plugs in the 7-foot short head crusher. Drive for the No. 1 conveyor is at right.

YERINGTON—

LEACHING TANKS with the unloading bridge above and in the background. Lower, loading bridge in foreground.

Agglomeration Proves Key To Low Cost Circulation Leaching For High Recovery

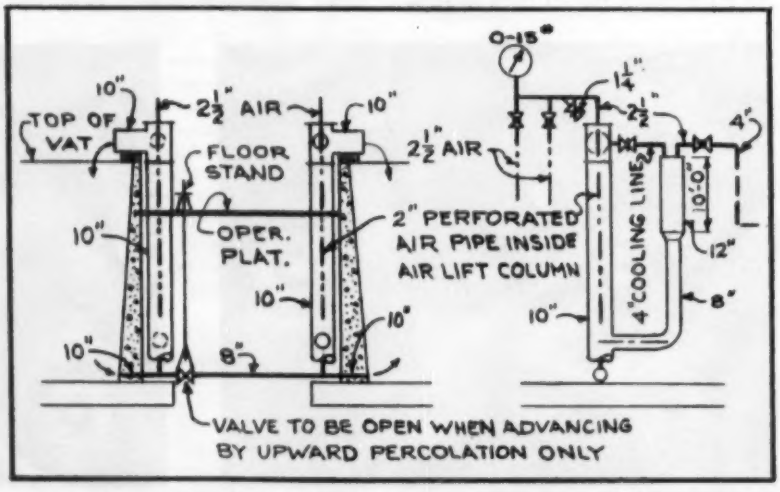
One of the unique features of the leaching is the agglomeration process which is used in order to avoid the necessity of constructing and operating a desliming plant.

Preliminary experimental work on the copper oxide ores was carried on many years ago under the direction of the late Walter Scott, plant superintendent at Inspiration Consolidated Copper Company. Additional experimental work was conducted at Weed Heights, Nevada during 1952 and 1953 under direction of the local management and plant superintendent, A. J. Gould.

The experimental work carried on at the plant determined the proper size for crushing. This was found to be minus-⅜-inch. Inasmuch as it was found that the ore averaged from 5 to 12 percent minus-200-mesh, it was decided that some method would have to be devised in order to prevent the slimes from entering the leaching vats as such, and thus block the percolation of solutions. A desliming plant would be costly to install and also to operate and would require additional treatment of the slimes themselves in order to recover the copper content.

Low Cost Method

Experimentation developed a simpler method known as agglomeration. The crushed ore is agglomerated by increasing the moisture content from 2 to 4 percent contained moisture (run-of-pit) to 5 to 6 percent. Moisture is added by fine water sprays following six of the eight discharge chutes to the No. 6 conveyor belt in the secondary crushing plant. As the ore is layered on the belt, from the chutes, each of six layers can be sprayed if necessary. This provides layers of dry material on a wetted surface. The amount of moisture added to the ore is determined by visual observation. The main criterion is that the ore stream should show no dusting as it is bedded in the leaching tank. By raising the moisture content, two important factors are achieved: the moisture has a tendency to cause the fines to adhere to the coarser particles, and also for the fines to adhere



RECIRCULATING AIR LIFT and 93 percent sulphuric acid piping details at leaching tank.

together to form larger particles. A size analysis of the ore shows 30 to 40 percent on 4-mesh, 70 to 75 percent on plus-20-mesh and 7 to 14 percent minus-200-mesh.

Leaching

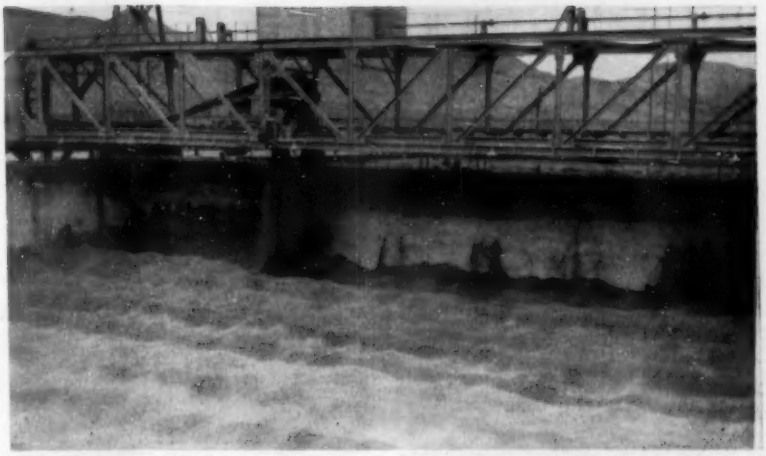
Anaconda uses a circulating leach with dilute sulphuric acid to recover copper from the oxide ore.

Eighty-four to 120-hour leaches, followed by 32 hours of washing are carried out in eight leaching tanks which hold one day's mine production, 11,000 dry tons. A constant speed tripper mounted on a mobile bridge distributes feed to an empty tank. Residue remaining after the leaching and washing processes is dug from the leach tanks with an 8-ton clamshell bucket and discharged to two 50-ton hoppers mounted on a traveling unloading bridge. The hoppers discharge into 25-ton rear-dump Diesel trucks which haul the residue to a waste dump.

Cementation Process

Pregnant solution from the leaching section is piped to a storage reservoir; from there 750-gallon-per-minute pumps feed the iron launders. A combination upward and downward weeping, and horizontal flow for stripping nearly spent solution is used to extract the copper from the pregnant solution in the iron launders.

AIR LIFT PUMP for circulating leaching solutions at left with the special acid mixing tube at right.



LOADING BRIDGE over the leaching tanks is equipped with a constant speed trip conveyor to evenly distribute the crushed ore within the tank. The bridge has a designed capacity of 1,100 tons per hour.

Cement copper is dug from the launders by a clamshell bucket operating from a gantry crane. Buckets are emptied in hoppers feeding two 5- by 18-foot trommel screens. Wash water used with the trommels is collected in a sump and pumped back to a settling launder to recover fine copper precipitate which may follow the wash water.

Partly used scrap iron is discharged from the end of the trommels. This material is recharged to the launders. Cement copper passing through the openings in the trommels goes to drainage basins and then drying basins. Dried cement copper is then loaded into trucks and hauled to the nearest railhead for shipment to the company's smelter at Anaconda, Montana.

Leaching Cycle

Leaching of the 0.90 percent ore in each tank requires 84 to 120 hours, and washing of the residue, 32 hours under the cycle presently employed. Loading the 11,000-ton charge to the tank requires approximately 12 hours; digging of the residue takes 16 to 17 hours. The leach cycle will probably best be understood by following one tank through the covering, recirculation, and washing steps. Let's take No. 6 tank, for example.

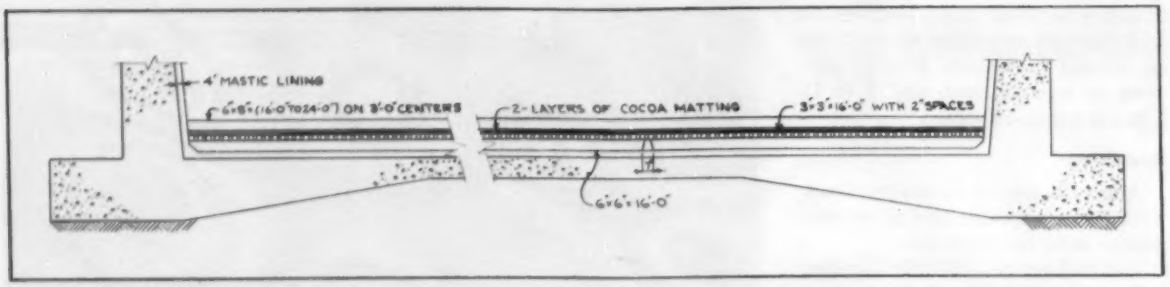
The cycle presently employed is to cover a new tank every 21 hours. The freshly loaded tank is covered with a 20-to-25-grams-per-liter solution of H_2SO_4 which is advanced from tank No. 5. A combination upward and downward percolation is used for covering. Upward percolation from the No. 5 tank is used to force out much of the air until back pressure from the hydrostatic head, pipe, and bed friction materially slows up solution addition. Bottom feed valves are then closed, and covering solution added at the top until the tank is filled. Covering of the ore requires about six hours.

Recirculation

A three-hour recirculation period, during which time solution collecting in the drain channels is pumped through an airlift and introduced to the top of the tank, takes the solution almost to neutrality as copper is dissolved.

At the beginning of the six-hour displacement which follows solution recirculation, all tanks are advanced. That is, solution collecting in the drain channels of each tank is pumped to the next tank in line. Neutral or pregnant copper solution from No. 6 tank flows to the two 286,000-gallon storage tanks. Neutral solution continues to drain until acid concentration in the underflow builds up to approximately 8 grams per liter at which time tanks go on another recirculation cycle for 9 hours. During the recirculation periods 93 percent acid is added to acid mixing tubes until desired concentration of from 40 to 60 grams per liter is reached. The following 60 to 96 hours consist of alternating displacements and recirculation periods.

Three washes follow, which consume 32 hours. The first or advancing wash water consists of advancing filter product from the No. 5 tank which has just received its first wash. Second and third washes are with slurry from the Peabody scrubbers



CONSTRUCTION DETAILS for the filter bottoms of the leaching tanks showing timber spacing and cocoa matting.

in the sulphuric acid plant which contains about 3 grams per liter of H_2SO_4.

Following the first three-hour circulation period when solution reaches near neutrality, the specific gravity of the pregnant solution is 1.26. Strong solution added at the top is 1.23. The rise in specific gravity of the pregnant solution is due to the dissolved copper.

Acid Mixing Tube

For solution circulation, air lift pumps are used. Three 550-cubic-feet-per-minute compressors furnish air at 30 pounds per square inch that is reduced to 8 pounds at the lifts. Since sulphuric acid mixes with water very slowly, 93 percent acid (specific gravity 1.84) would percolate through the mass to the discharge without mixing. For this reason acid mixing tubes were developed to thoroughly mix fresh acid before it is introduced to the tank. A small portion of low acid solution is bled off at the top of the air lift and discharged to an 8-inch tube connected to the bottom of the air lift. Strong, 93 percent acid, fed at rates up to 70 gallons per minute, is added to the tube. Tumbling of bleed-off and strong acid to the bottom of the tube thoroughly mixes the solutions.

Acid Consumption

Each tank holds about 800,000 gallons and approximately 1,000,000 gallons per day are sent to the iron launders. Drainage of the third wash requires about four hours. Acid consumption is 80 pounds of 100 percent H_2SO_4 per ton of ore. The relatively high figure results from acid soluble iron in the ore (about four pounds per ton of feed). Seventy-five percent of the iron is in the ferric state. Leach extraction of the copper in the ore is 88 percent. Soluble copper content of the feed is between 92 and 93 percent of the heads.

Agglomeration of Fines

Ore from the mine contains 7 to 13 percent minus-200-mesh fines, the average being about 10 percent. The minimum practical particles size for leaching by percolation is ⅜ inch. The fines which often contain gangue and clayey material presented a serious problem to the hydrometallurgists. Copper extraction was slowed and erratic recoveries were obtained.

Following test work, a simple low-cost method was devised to agglomerate the fines to larger particles to obtain even distribution for leaching by percolation. This is accomplished by mixing and tumbling the ore on conveyor belts.

Agglomeration has:

1. Accelerated the leach.
2. Given better extraction of copper by cutting down on channeling of solution through zones of high permeability in the tanks, and provided an even distribution of solution throughout the leaching tank.

Copper extraction which varied between 70 to 90 percent has now settled at 88 percent.

Materials Handling

Two traveling bridges—one for loading, the other for unloading—handle feed and leached residue in the leach tanks. Each bridge is trolley-operated and spans the tanks, running on rails on either side of the leach tanks.

The loading bridge mounts a constant speed trip conveyor which distributes feed to the leach tanks. The operator from his cab on one end of the bridge has full control of the bridge travel along the line of the tanks, and the trip conveyor on the bridge. The bridge was designed to handle a load of 1,100 tons per hour, and has a horizontal travel of 54 feet per minute.

The unloading bridge, a rope trolley type, straddles the tanks; the tower at one end of the structure contains the operator's cab, and two 50-ton hoppers. An 8-ton clamshell bucket digs the material from the tanks, and discharges leached residue to the hoppers. Twenty-five-ton trucks loaded through motor operated gates on the hoppers haul the residue to a waste dump. The unloading bridge was designed with sufficient clearance so that it could ride over the loading bridge.

Leach Tank Construction

Leach tanks measure 120 by 135 feet inside dimensions at the top. A 20-inch filter bottom and allowance for freeboard makes the working depth of the tank 18.8 feet.

The tanks are of reinforced concrete. Wall thickness at the top is 1-foot, but wall batter produces a 3-foot thickness at the bottom. Mastic lining (30 percent asphalt, 70 percent sand) reinforced with two layers of 6-inch-square, No. 2 gauge welded wire is used to protect concrete from the corrosive action of H_2SO_4. To date no trouble from sagging of the lining has been experienced. Temperatures of solution average about 90° F. throughout the circuit; however, wash water from the Peabody scrubbers enters in the neighborhood of 110° to 120° F.

The filter bottom is built up by three layers of timber stringers, and two layers of cocoa matting. The bottom layer is made up of 12- and 16-foot long, 6- by 6-inch timbers spaced on 6-inch by 1-foot centers. A 2-inch spacing between ends of the timber allows the solution to drain to three transverse and two longitudinal drain channels. Timbers 3 by 3 inches in cross section and spaced 2 inches apart are placed at right angles over the bottom layers. Two layers of cocoa matting are nailed over the 3-inch stringers. To protect the matting, 6- by 8-inch timbers on 4-foot centers are placed over it.

SPECIALLY DESIGNED light weight Shrader magnet (at left) is used to handle scrap iron. Truck at right unloads scrap to bin alongside precipitation launders.

Rapid Formation of Coarse Copper Particles Is Precipitation Goal

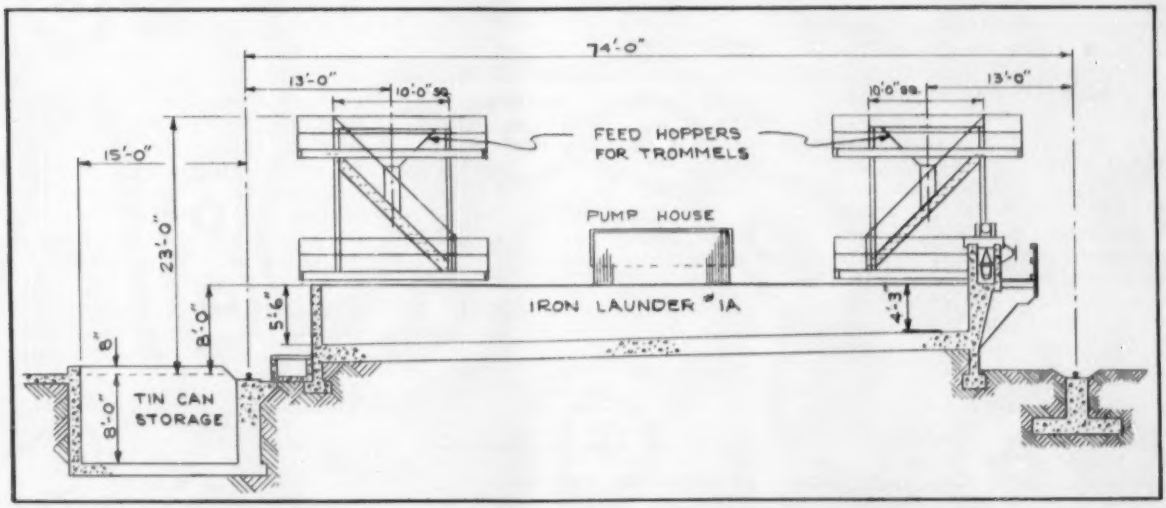
The cementation plant consists of 20 parallel launders with common walls to which light gauge scrap iron in the form of cleaned tin cans is added for precipitation of copper from pregnant solution. Each launder consists of an "A" and a "B" section; they are divided by a vertical concrete wall butted at one end to the tank wall but a 6-foot spacing allows solution to flow from one section to another within a launder. Size of each section is 10 feet in width by 58 feet in length. Tanks are 4 feet 3 inches deep at the shallow end and 5 feet 6 inches deep at the opposite end. Launders Numbers 1 through 20 are set on a 1.25 percent slope to facilitate solution flow from cell to cell.

Precipitation Cycle

During normal operations 13 launders are in service; a 14th is used as a settled basin for the trommel wash water. The remaining units are in the process of being cleaned or having light gauge scrap iron charged to them.

A solution-distributing launder running the full length of the 20 cementation cells contains both overflow weirs and 3-inch holes leading to the weep gutters under each compartment. A cementation launder may either be fed by:

1. Overflow weirs and draining through one of three weep gutters running the full length of each section or,



CROSS SECTIONAL DIAGRAM of copper cementation plant showing construction details.

CEMENT COPPER is reclaimed from the launders with a gantry crane and dumped into a hopper feeding this 5 by 18 foot trommel. The copper is washed through the openings and the cleaned scrap iron discharges at end.

2. An upward weep in both compartments and draining to the next section through 6-inch bleed holes in the wall;

3. Upward weep in the "A" section and a downward weep in the "B" section.

A typical circuit for solution flow presently used is to feed sections 2 through 8 in parallel—weeping up in the "A" compartment and down in the "B" compartment. Some 80 to 85 percent of the copper is stripped from the solution at this stage. Solution from the "B" compartment of section 2 through 8 drains to a recirculating launder leading to an 80,000-gallon sump. A 750-gallon-per-minute pump drawing from the sump circulates this solution back to a distributing launder where it is fed to sections 9, 10, 11, and 12 in parallel.

Downward Weep Follows

The method used at this stage is to introduce the partially stripped solution to these sections from overflow weirs in the distributing launder and weep down in both compartments of each section to gain solution velocity. The solution is practically stripped of all copper at this stage, but a final treatment in sections 13 to 14, charged with a minimum amount of scrap iron, insures maximum precipitation. A horizontal flow of solution over the iron is used in this last step—draining through bleed holes to the spent solution launder leading to a 30,000-gallon sump.

Removing Precipitate

Cement copper is reclaimed from the launders with a gantry crane equipped with a 6-ton clamshell bucket dumping into 8-ton hoppers which feed two 5-by-18-foot trommels. The copper is washed through the openings in the trommel to a 36- by 36- by 7-foot deep settling basin. Discharge from the end of the trommel consisting of washed scrap iron falls to a pit, the material being recharged to the launders.

Cement copper in the settling basin is transferred to two 30- by 30-foot drainage basins with cocoa mat filter bottoms, and finally to two drying basins. Gas fired burners under the 5- by 10-foot plates lining the bottom of the drying basins reduces the moisture content of the precipitated copper to about 19 percent. Drying below 15 to 16 percent H_2O produces a dusting problem from winds.

Water from the drying and settling, and draining basins is collected in a sump and pumped back to section 1 of the cementation launders. Purpose of this arrangement is to settle fine, flaky copper which tends to be carried off by the water.

Gantry Crane

A gantry crane spanning the cementation launders contains a lifting magnet for charging scrap and copper to the washing trommels, and into trucks. The crane, mounted on rails, has a travel length of 720 feet. The lifting magnet charges scrap iron to the launders at a rate of 10 to 12 tons per hour.

Cement copper, averaging 80 percent copper, is loaded with the gantry crane into 18-ton side-dump trailers pulled with Diesel engines. These trucks haul to the railhead at Wabaska, Nevada, a distance of 12 miles. From here is it shipped to the company's smelter at Anaconda, Montana. On the return trip to Yerington trucks haul light gauge scrap iron (de-tinned cans) which are shipped from Los Angeles. At Weed Heights they are dumped into an 8-foot-deep, 14-foot-wide by 437-foot-long pit paralleling the length of the cementation launders.

Precipitation Theory

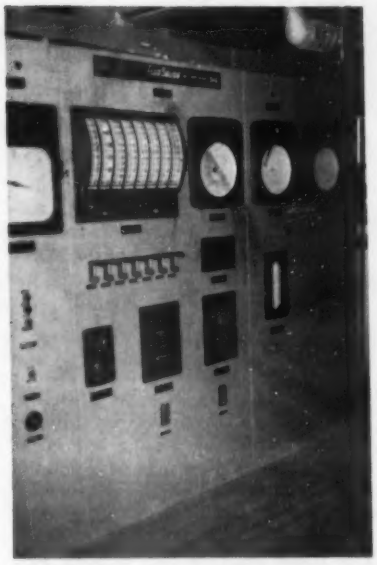
Pregnant solution fed to the iron launders contains 15 to 30 grams per liter of copper, the average being about 24 grams per liter. Sulphuric acid content of the pregnant solution is maintained at 4 to 5 grams per liter. The acid content of solution to precipitation is a process loss. In this solution a minimum acid content of 4 to 5 grams per liter is essential to rapid precipitation, and to the retention of salts in solution that would otherwise become an impurity in the product. Every effort is made to maintain solution velocity through the iron and avoid stagnant areas. This tends to coarsen particle size of precipitated copper and prevent acid reaction with the iron. Acid content of discard solution is 2 to 3 grams per liter. At present 99.76 percent of copper in pregnant solution is precipitated.

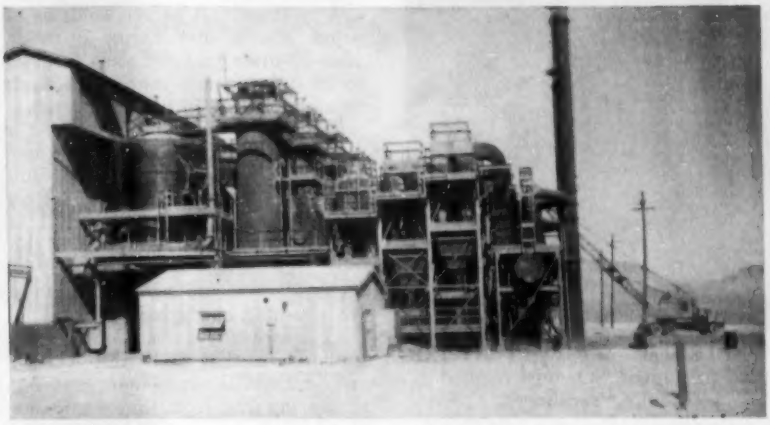
Iron consumption

Iron consumption in the process comes from three sources and amounts to about 1.25 pounds per pound of copper precipitated. Ferric iron in the solution sent to precipitation amounts to 8 to 12 grams per liter. Although this may aid some in dissolving certain copper minerals during the leaching process, it also serves to re-oxidize some of the cement copper and put it back in solution during the precipitation process. Iron in the ferric state also consumes the scrap. Other sources of scrap consumption are the acid in the pregnant solution and the copper, of course.

OPERATIONAL DATA ON LEACHING AND CEMENTATION

Acid consumption	75 pounds of 100 percent acid per ton of ore
Copper extraction in leaching	88 percent
Copper recovery in cementation	99.65 percent
Iron consumption (cementation)	1.25 pounds per pound of copper precipitated
Copper contained in pregnant solution	15 to 30 grams per liter
Sulphuric acid contained in pregnant solution	2 to 8 grams per liter
Ferric iron contained in pregnant solution	7 to 9 grams per liter
Strength of covering solution (H_2SO_4)	20 to 35 grams per liter
Strength of covering solution after first and second advance (H_2SO_4)	40 to 55 grams per liter
Strength of first wash (H_2SO_4)	3 grams per liter





CONTROL PANEL for one of the four FluoSolid reactors is shown at left. The reactor plant is pictured at right with the rod mill building, reactors, water coolers, and three banks of Buell cyclones.

Sulphuric Acid Plant Is First To Use FluoSolid Roasting of Low Grade Ore

Anaconda's acid plant—one part FluoSolids, one part contact acid process, and one part resourcefulness—produces H_2SO_4 for leaching copper oxide ores.

The Yerington operation, a monument of metallurgical and mechanical firsts, utilizes FluoSolids generators to produce SO_2 from low-grade sulphur ore. New features incorporated in the fluidized roasting system are:

F. M. MONNINGER, general plant foreman came to Yerington from Inspiration where he was a metallurgist.

1. Use of a low-grade ore containing 25 to 30 percent total sulphur.

2. Dry feeding of Dorrco reactors from the top.

3. Bottom discharge of calcines from the FluoSolids generators or reactors.

Nothing new or unusual is involved in producing acid by the contact process, but know-how, plant design, and close control of temperatures are important. The acid plant, constructed by the Chemical Construction Corporation, is highlighted by its extreme flexibility. The plant can operate at rated capacity of 450 tons or at 250 tons of 100 percent H_2SO_4 per 24 hours without blanking off one set of converters. It can be shut down for a period of time (up to 10 hours), and put back into operation within 15 minutes, without preheating by the starting furnace.

The world's largest blower for this type of service, a 58,000 cubic-feet-per-minute centrifugal fan, located just behind the drying tower, pushes the gas through both sections of the contact plant, and also maintains sufficient negative pressure to bring the gases from the reactors through the cyclones, scrubbers, and precipitators to the blower proper.

Number one problem at the plant has been the precipitation of smoke-size particles from the sulphur dioxide gas stream.

Simple Flowsheet

The relatively simple flowsheet of the ore through the FluoSolids plant utilizes two-stage crushing, followed by dry rod mill grinding and roasting in four parallel sections. When the acid plant is running at full capacity, three sections of the FluoSolids operate at a feed rate of nine tons per hour per section while the fourth serves as a standby. A screen located ahead of the shorthead crusher removes minus ⅛-inch material in the feed and has aided in preventing overgrinding in the 5- by 10-foot rod mills which are operated without classifiers.

Ore from the Leviathan mine (worked only during summer months) is stockpiled at the acid plant to provide for a year-around operation. The sulphur ore from the stockpile is loaded into 10-ton trucks by a 1½-yard shovel for the 500-foot haul to the dumping ramp. Trucks dump on a 15-inch square grizzly mounted above a 30-ton hopper. A 16-inch pan feeder under the bin discharges to an 18- by 36-inch jaw

COTTRELL PRECIPITATORS used to remove SO_3 mist formed in cooling scrubbers.

crusher set at 3 inches. Crushed rock is fed to a 5- by 8-foot vibrating screen by an 18-inch conveyor mounted on an 18° slope. A suspended lifting magnet and a magnetic head pulley remove tramp iron from the ore stream on the belt.

Screen Undersize Discarded

Undersize from the ⅛ Ty Rock screen, containing 12 to 15 percent sulphur, is conveyed to a loading hopper and trucked to a waste dump. Oversize passes to the 4-foot shorthead cone crusher set at ⅞ inches. Ore from the secondary cone crusher is distributed among four 300-ton conical bottom steel bins by a trip conveyor. Parallel conveyors draw from the fine ore bins and feed the rod mills. Transport feeders on each belt indicate tonnage rates on the FluoSolids control panel. Thus, the FluoSolids operator can vary belt speeds depending on roasting requirements in the Dorrco reactors. Rod mills operate with a low feed level; grates are installed to prevent broken rods from entering the discharge stream. A screen analysis of grind shows that minus-10-mesh, plus-20-mesh particles vary from 26 to 35 percent, and minus-200-mesh fines vary from 7.6 to 16.8 percent.

To control dust and to assure a clean plant (as well as to recover the dust for re-use) a multiclone mechanical collector is installed on each of the two crushers, as well as a separate multiclone on each of the four rod mills, making a total of six multiclone units in the sulphur ore crushing and grinding plant.

An interesting feature of this installation is that each unit has its own individual multiclone unit for recovering dust from that particular piece of equipment. This not only simplifies the duct and dampering system but also makes each unit completely independent of the others for maximum flexibility in overall plant operations.

Another interesting point is that the multiclones on both of the crushers are placed ahead of the induced draft fans so as to remove suspended particles in the gas stream before they reach the fans, thus prolonging the life of the fans.

Feeders Maintain Gas Seal

Four belt conveyors, traveling on an 18° slope, elevate the rod mill discharge to the top of each FluoSolids reactor. Rotary vane feeders, located at the discharge end of the belts, supply the reactors through a 4-inch opening in the top of the vessel. Several devices have been tried by Anaconda, but the vane feeder seems to give the best seal between the outside atmosphere and the hot interior of the reactor. Danger of "blowbacks" as ore is introduced is eliminated.

Crushing and Screening

Crushing and screening facilities have now been installed at the sulphur mine at Leviathan to reduce the ore to a 5-inch size, and also remove minus-⅛-inch material before the ore is trucked to Weed Heights.

What is FluoSolids?

Briefly, FluoSolids is a process for fluidizing a mass of solid particles. Air introduced by a blower through a constriction plate at the bottom of a reaction chamber at 3 to 5 pounds per square inch, will cause a partial suspension of a 1- to 5-foot bed of particles ground to 14-mesh, or finer. The mass behaves like a fluid, exhibits hydrostatic pressure, flows through pipes or overflows weirs. The process as developed may be used to roast sulphur or sulphide ores.

Heat applied by burning gas above the bed along with the introduced air brings the bed up to reaction temperatures, after which the combustion of the sulphur serves as the fuel to maintain the roasting temperatures.

Process Developed by Dorr

Normally, feed is introduced as a slurry at the side of the reactor near the top of the bed, and the air introduced to the windbox below the perforated constriction plate uniformly permeates the bed. Calcine overflowing to a discharge pipe at the top of the bed is collected for waste disposal. Gases drawn out at the top of the reactor must undergo a treatment to remove dust.

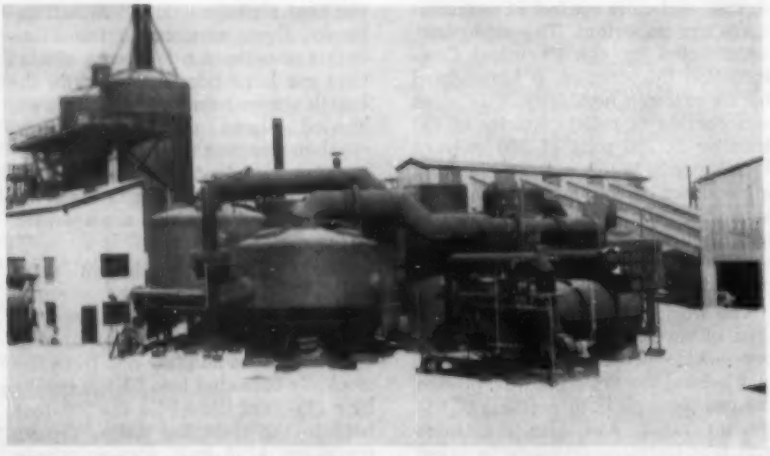
Advantages of the system as developed by the Dorr Company are no moving parts, intimate contact between air and solids is maintained, chemical efficiency is high, temperatures are uniform and the process is well instrumentized, and close control of temperatures and conditions can be maintained.

Anaconda's Plant

The FluoSolids process at Weed Heights is used to produce SO_2 gas from a native sulphur ore (containing minor amounts of pyrites) for a contact sulphuric acid plant.

Several new procedures have been originated to adapt the system to Anaconda's operating problems.

Dry feed of the low-grade (25 to 30 percent) sulphur ore is introduced at the top of the reactor, while roasted



CONTACT SULPHURIC ACID PLANT showing the start-up furnace in the right foreground, the primary and secondary converters and heat exchangers. At far right is rod mill building and conveyors to FluoSolids roasters.

calcines are removed from the bottom.

Top Feeding

The company's decision to feed from the top was based on the fact that ore from the stockpile, containing 10 to 12 percent moisture, was very sticky and hard to handle. Normal side feeding by screw conveyors led to troubles since chutes and augers plugged. Dry feeding is utilized in order to grind as coarse as possible.

Bottom Discharge of Calcines

Bottom discharge of the calcine permitted a coarser grind, and a reduction in the control required over the product produced by the rod mills. Theoretically, particles must be ground small enough so that air requirements necessary for roasting will keep the bed fluid. The innovation maintains satisfactory roasting conditions without excessive air requirements for ideal suspension.

Bed Temperatures—1,200°

The four reactors are 18 feet in diameter by 25 feet in height, and are lined with a 4½-inch layer of fire brick; a 4½-inch layer of insulating brick next to the shell prevents excessive heat losses and possible condensation of corrosive, SO_3 gases. Air for the windbox is furnished at 3 pounds per square inch by a 13,000-cubic - foot - per - minute positive blower. The reactors are operated with a four- to five-foot bed; exact depth depends on quantity of feed required to maintain operating temperatures and retention time desired. Using a 5-foot fluidized bed and a 9-ton-per-hour feed rate, detention time is approximately 5½ hours.

Capacity of the reactors depends on sulphur content of the feed. Although they are very flexible and can handle considerable variations in tonnage. Normally, any feed rate from 50 to 150 percent of degasified capacity can be roasted without difficulty.

Bed temperatures average 1,200° F. while the temperatures in the freeboard (chamber above the bed) are approximately 50 to 100° higher. Two Bryant pre-heating burners fired with propane gas, heat the reactor to 900° before feed is introduced. The burners are monitored to a pilot light on the control panel so that operators can tell at a glance if the flame has blown out during start-up operations. Shutdowns and start-ups involve only a matter of minutes. After a shutdown, the Reactors hold enough heat for several days to permit start-up again simply by putting the blower and feeder back in operation.

The perforated steel constriction plate, upon which the bed of roasted sulphur ore rests, is reinforced with steel beams and ribs and insulated with refractory brick. Non-sifting air nozzles are installed on the plate for air distribution.

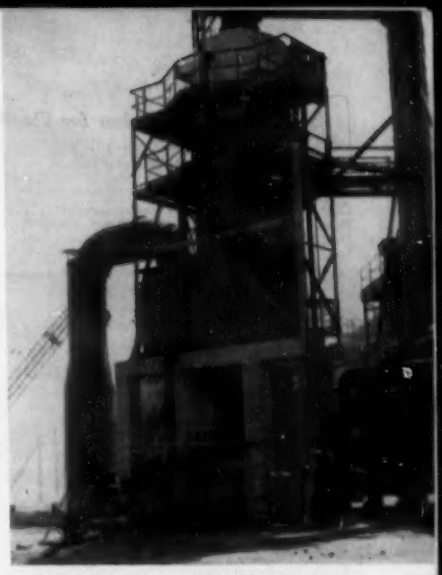
Flow of Gas

Dust-laden SO_2 gas from each reactor passes to a two-compartment cooler where it is hit with 20 high-pressure water sprays. Water introduced to each nozzle at 250 pounds per square inch in the A compartment, cools the gas from 1,250 to 900°. The cooled stream enters a series of Buell cyclones where approximately 92 percent of the dust is dropped.

The gas stream leaving each cooler divides at the first bank of cyclones, and each section passes through two cyclones in series, in each of the three banks. Sulphur dioxide flows to the acid plant erected by the Chemical Construction Corporation. Volume of gas sent to the contact plant is about 32,000 cubic feet per minute of 8 to 12 percent SO_2 when three reactors are operating at full capacity. Theoretically a gas strength of 18 percent SO_2 could be produced. However, since 12 percent SO_2 is sufficiently strong for acid plant work, the installation was designed on that basis to minimize the chance of volatilization of elemental sulfur.

Dust and Calcine Flow

Calcine from the reactor, dust dropped in the A and B compartments of the coolers, and particles which settle in each cyclone bank are sluiced to an evaporation area with spent solution returned from the cementation plant. Sulphur content of calcines is 0.06 percent while cyclone discharge analyzes 0.09 percent sulphur.



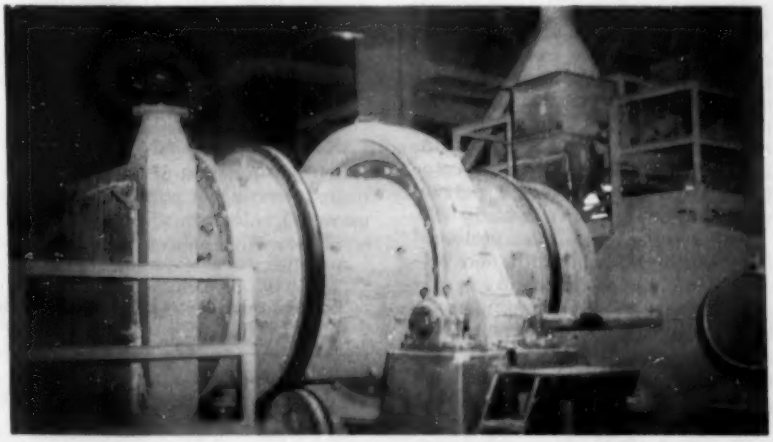
FINE DUST PARTICLES are removed from the gas by this scrubber. It precipitates 97 percent of particles.

A Dorr fluo seal on the calcine discharge, rotary valves on the coolers and first cyclone bank discharge, and a PMF drop door discharge on the second and third cyclone banks maintain gas tight seals throughout the installation.

Instrumentation

Precise and accurate control of conditions is maintained by an elaborate system of indicators and automatic controls. In the operators' room there are four control panels—one for each reactor. Each panel is equipped with:

1. A transportodicator—indicates and controls feed to rod mills.



DRY GRINDING of the sulphur ore is done by four of these 5 by 10 foot rod mills. Specially designed two-tire open end Marcy rod mills operate at a low feed level.

Operational Information for FluoSolids Roaster and Sulfuric Acid Plant

Grade of plant feed	25-30 percent sulphur
Calcine discharge	0.04 percent sulphur
Buell cyclone discharge	0.06 percent sulphur
Dust content of gases to Peabody scrubber	1,500 pounds per hour
Dust content of gases from Peabody scrubber	50 pounds per hour
Dust content of gases to Cottrells	50 pounds per hour
Dust content of gases from Cottrells	6 to 8 pounds per 24 hours
Moisture content of gases to drying tower	2.0 percent water
Moisture content of gases from drying tower	2.30 milligrams per cubic foot
SO_3 content of gases from Dorr reactors	8 to 12 percent
SO_3 content at first heat exchanger	7.8 percent
Gas conversion efficiency (SO_2 to SO_3)	97.5 percent
Peabody scrubber efficiency	95-97 percent

2. Pressure indicators—which indicate pressure or pressure drops in the windbox, constriction plate, reactor bed, cooler, and cyclones. Bed depth is controlled by pressure drops indicated.

3. A bed temperature controller—if temperatures of the bed rise over 1,250° F. cooling water from a ½-inch pipe is automatically introduced.

4. A gas temperature controller—controls temperature of gas leaving the cooler. If temperature builds up over 900° F. sprays are automatically turned on.

5. A gas analyzer—indicates SO_2 content of stream leaving the cyclones.

6. Temperature recorders in the windbox, each quadrant of the bed, and the freeboard.

7. Air flow meter—which records air flow to windbox from the blower.

Contact Plant Well Designed

The 8 to 12 percent SO_3 gas produced by the roasters passes through a five-foot flue to a Peabody scrubber for elimination of fine dust; four Cottrells for precipitation of SO_3 mist; a drying tower containing 93 percent H_2SO_4; and then to the contact acid plant. Primary and secondary convertors in each section of the acid plant produce SO_3, and operate with three heat exchangers. Conversion efficiency (SO_2 to SO_3) is 97.5 percent. Sulphur trioxide produced in the secondary convertor, following a pass through two heat exchangers, enters the absorption tower containing 98 percent H_2SO_4 where it combines with the 1.0 to 2.0 percent water present to form sulphuric acid.

An extremely fine dust produced from the hydroscopic tuffs and volcanic agglomerate gangue in the sulphur ores created an operating problem which had to be overcome. Fine dust would blind the V_2O_5 catalyst in the convertors and build up back pressure at that point.

The gas stream in the 5-foot flue leading to the Peabody scrubber carries 25½ pounds per minute (1,500 pounds per hour) of material 50 percent of which is one micron in size, or smaller. Smoke particles commonly measure 10 to 25 microns.

Efficient Scrubbing

A Peabody scrubber operating at 95 to 97 percent efficiency handles the problem quite adequately. Dust in the outlet measures about 50 pounds per hour. The unit consisting of two sections, a humidifying compartment and a stripping compartment, cools the gas from about 750 to 100° before it enters the Cottrells. Water from the acid cooling towers enters the top and passes down through a series of perforated stainless steel plates to the stripping compartment. Holes in the plates vary from 5/16-inch to 1/10-inch in size. Gas, entering through the humidifying compartment, is discharged at the top of the scrubbing compartment. The slurry produced in the stripping pan, containing 3 grams per liter of H_2SO_4, is piped to the leaching section where it is used for the second and third washes.

Air introduced from a 2,300-cubic-foot-per-minute blower, purges SO_2 from the down flowing water in the stripping compartment. Gas temperatures at the outlet must be maintained at about 100° in order to get a good stripping effect. For this purpose, provision has been made to introduce fresh water to the scrubber along with that from the cooling tower to attain the relatively low temperature. Total water requirement for the Peabody scrubber is 500 to 600 gallons per minute.

Cottrells Remove SO_3 Mist

Primary function of the four Cottrells operating in parallel is to remove SO_3 mist formed in the cooling scrubbers. Acid concentration of the gas from the Peabody scrubber is 50 milligrams per cubic foot, while only 0.2 miligrams per standard cubic foot remain after mist precipitation. Efficiency of the Cottrells is better than 99.5 percent. Dust drop in the precipitators reduces the load from about 50 pounds per hour at the entrance to 6 to 8 pounds per 24 hours at the exit.

The rectifiers used with the precipitators are of the electronic tube type and were designed for handling a gas volume of 33,900 cubic feet per minute at 110° F. with an operating suction of 30 inches water gauge and an overall recovery of 98 to 99 percent.

Air Swept Insulation

The lead-lined tubes containing the star-shaped wires in the precipitator were re-inforced to make them structurally stronger to prevent arcing between the tube and wire. An air-swept insulating compartment replaces the oil seals usually found on these units, making it possible to pull a higher vacuum without danger of losing oil from the seal, and eliminating fire hazards.

The Cottrells were designed to handle a capacity of 100 milligrams of SO_3 mist per cubic foot of gas. Current, brought in at 440 volts, is transformed to 75,000 volts and rectified to DC.

Precipitated dust is slurried, and joins that from the Peabody stripping pan for use as wash water in the leach plant. Gas flows into the bottom of the drying tower containing 93 percent H_2SO_4 for removal of moisture prior to conversion in the acid plant.

Drying Tower

Controlled addition of strong (98 percent) acid from the absorption tower maintains H_2SO_4 content in the drying tower at 93 percent, at the temperature of operation (100°).

Moisture content of the SO_2 gas is reduced to 2 to 3 milligrams per cubic foot in the tower packed with spiral tile rings 3 inches in diameter by 3 inches in length. Make-up water for that consumed by SO_3 in the absorption stage is added at the drying

(*Continued on page 80*)

Temperature Control Data for FluoSolid Reactors and Sulphuric Acid Plant

Location	*Temperature*
Reactor bed	1,200°F.
Reactor freeboard	1,250° to 1,300°F.
FluoSolids cooler	900°F.
Peabody scrubber inlet	700°F.
Peabody scrubber outlet	100°F.
First two heat exchangers increase temperature from	100° to 500°F.
Third heat exchanger raises temperature from	500° to 820°F.
Primary converter outlet	1,120°F.
Secondary converter inlet	820°F.
Secondary converter outlet	850°F.
Absorption tower inlet	450°F.

K. W. HUMPHREYS, employment and personnel supervisor, also directs the safety program. H. L. CHESAREK (center), chief clerk has worked for Anaconda in Montana and California before Yerington. At right are some of the attractive homes in Weed Heights where streets are named for famous Nevada mining camps.

Anaconda Builds Weed Heights—Nevada's Most Modern Town With All Recreational and Community Facilities

Community facilities at Weed Heights are modern and attractive, to say the least. Family homes are of one-, two-, and three-bedroom sizes. These total 250, 53 of which are three-bedroom, 116 two-bedroom, and 80 one-bedroom. There is also the manager's residence. The houses are of frame construction with asbestos roofing, asphalt siding, and concrete floor covered with asphalt tile. Each house has a garage, a lot averaging 80 by 80 feet in size, and is equipped with a space heater, kitchen range, refrigerator, automatic water heater, and an automatic washer. The three-bedroom homes rent for $30 a month, two-bedroom homes for $25, and one-bedroom homes for $20. Rent includes water and garbage disposal service. Electricity is purchased from the company at 1¾ cents per kwh. Propane for the kitchen stove and space heater is purchased by the individual.

In addition to the family dwellings, eight apartment units containing single rooms provide living quarters for 120 single men. These rooms rent for 50 cents per day. The townsite also incorporates a trailer court with accommodations for 52 trailers. Modern bath and laundry facilities and all utilities except propane are furnished for $7.50 per month.

For home improvements and landscaping the company furnishes the top soil and fertilizer and sells garden tools and grass seed at cost. The people take a great deal of pride in their homes and have beautiful lawns with flowers, shrubs, and trees.

Weed Heights has a soda fountain where light meals are served for the single men and for family outings. The town also boasts of a third class government post office.

Recreation Club

A non-profit recreation association known as the "Weed Heights Recreation Club" has been formed. Dues of $2.00 per month are used for movies, dances, and parties for children. Recreation facilities provided by the company include a recreation hall for movies and dances, a large modern swimming pool of a size designed for a population of 10,000, children's playground, ball field, tennis courts, volley ball courts, and a golf course that is now under construction. Townsite construction was contracted to Wiechmann & Probasco Co., of Reno, Nevada. Laying out of the townsite and corresponding engineering was done by Anaconda's own personnel.

Personnel and real estate is under the supervision of Ken Humphreys, employment and personnel supervisor. In addition, he is also in charge of the safety program and fire prevention.

The accounting and timekeeping is under the direction of Henry L. Chesarek, chief clerk, and is controlled by both the local management and also general accounting practices and procedures from the Butte, Montana office.

Active Safety Program

An outstanding safety record is being maintained; no fatalities have occurred and lost-time accidents for 10,000 shifts (first three months of 1954) was 2.16.

The safety committee is made up of six men from different operational sections, all having had previous experience in safety. Inspections are made every two weeks, so that every part of the plant, mine, and townsite is inspected once in every six weeks. Recommendations for elimination of hazardous conditions are then given to the general manager. Safety suggestion boxes are also located in key places where men are working. These suggestions are reviewed by the safety committee and recommendations made.

A volunteer fire brigade has been organized with an active crew of 12 men. All company vehicles are equipped with portable fire extinguishers as an added safety factor. A Red Cross first aid instructors' class has been completed and it is planned to have every man trained in first aid. An important asset to the safety program is the short-wave communication system whereby orders can be quickly given to all parts of the plant and pit.

OPEN PIT SULPHUR MINE shown at left is the Leviathan in Alpine County, California. The picture at right shows a 5-yard electric shovel loading one of the trucks. Stripping is on a three shift per day basis.

YERINGTON

How Open Pitting Solved Difficult Mining Problem At Leviathan Sulphur

The sulphur occurs mainly as elemental sulphur impregnating extremely altered volcanic tuffs, agglomerates, and andesites. The ore body averaging 25 percent sulphur is a gentle dipping layer up to 100 feet thick.

Because the ore burns very readily, it is being mined by open-pit methods obviating the danger to underground mine personnel and preventing the ore body from burning up. Spontaneous combustion fires have occurred during the mining, but have been easily controlled. The stripping ratio is approximately 10 to 1.

19,000,000 Tons of Waste

The overburden consists of about 200 feet of altered volcanic rock. A small portion of the over-burden was intensely silicified and this gave a certain amount of trouble in drilling due to the abrasive nature of this type of silicification.

The Isbell Construction Company of Reno was given a contract for preliminary stripping at Leviathan and when they have completed their work they will have stripped approximately 19,000,000 tons of overburden. The natural contour of the ground leads itself very readily for open pit mining approach.

According to Anaconda's General manager, A. E. Millar, Isbell has done and is still doing an excellent job in removing the overburden and in careful watching for the appearance of sulphur bearing ore.

Drilling of the overburden is done with four churn drills, drilling 9-inch holes and one rotary drill boring 5⅝-inch holes. Thirty to 60-foot high benches are being stripped.

Drilling Statistics

Anaconda Copper Mining Company

Leviathan Mine
May 19, 1954

ROTARY DRILLING
Joy 225-Truck Mounted-Rotary Drill
Blast Hole Drilling
Feet Drilled per shift 309
Feet Drilled per bit 1,427
Prospect Drilling
Feet Drilled per shift 198
Feet Drilled per bit 1,427

Note: This drill has been used only for approximately 14,000 feet of drilling. Several different types of rotary drill bits have been used and we are unable to determine at this time what the eventual feet drilled per bit will be.

Blast holes, depending on the type of ground and size of hole are spaced from 15 to 25 feet apart. Holes are drilled to a depth of about 5 feet below bench grade and loaded with free-flowing 65 percent dynamite. Primacord detonating fuse is used, and where more than one row of holes is to be shot, the Primacord is used in conjunction with electric delay caps. Very little secondary blasting is required.

Loading of the broken waste is with two 5-cubic-yard electric shovels. Electric power is generated by a 750-kw Diesel generator. Twenty-two-ton rear dump Diesel trucks are used for hauling to the waste dump.

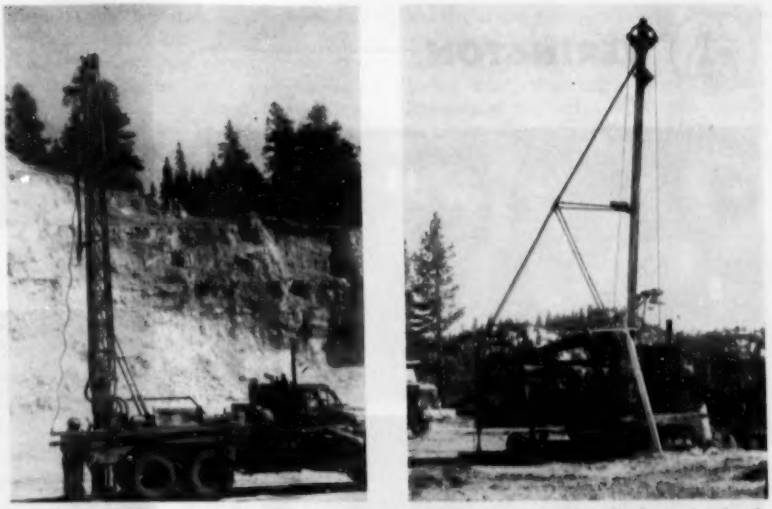
Selective Mining

Selective mining of the ore is done by Anaconda during the summer months. Mining is carried on at a rate of about 1,500 tons of 25 percent sulphur ore per day to provide some 250,000 tons required each year at the Weed Heights plant.

To aid in the selective mining a quick method of assaying the ore was badly needed. Anaconda's chief assayer at Weed Heights began working on this problem and developed what he calls the "burn test." A sample of the ore to be assayed is

dried in an oven at a temperature of 100° Centigrade. A 10-gram sample is then weighed out, put in a test tube, and placed over a Bunsen burner until all of the sulphur is driven off. The burnt sample is then weighed, the amount of sulphur that was present in the sample being the difference between this weighing and the previous one. Since there is nothing in the ore except sulphur and iron sulphides that will burn at a temperature under 1,200° C., this simple test checks out with an accuracy of 1½ percent and has proven to be of immense value.

Ore is mined in 15-foot-high benches. Blast hole drilling is done with a truck-mounted rotary drill, drilling a 4-inch hole. Holes are loaded with free-flowing powder and set off with Primacord detonating fuse, the Primacord being detonated with millisecond-delay electric blasting caps. Broken ore is loaded with two 1½-cubic-yard Diesel shovels into 10-ton rear-dump Diesel trucks.



BLAST HOLE DRILLING at the Leviathan sulphur mine is done by both rotary and churn drills. The drill shown at the left is a PortaDrill rotary while at the right is one of the four churn drills in use.

Fine Material is Low-Grade

Trucks dump their loads of ore directly into a hopper at the crushing plant. An apron feeder feeds from the hopper to a 4-inch grizzly; grizzly undersize falls to a double-deck screen. Contrary to most mining operations, the screen undersize, minus-⅛-inch material, is low-grade, instead of containing the values and is discarded as waste. Plus-⅛-inch material from the screen drops to a belt conveyor which discharges onto another cross conveyor used to feed any one of four 100-ton storage bins. Grizzly oversize, plus-4-inches, falls to a 40- by 25-inch jaw crusher. Crushed material then joins the ⅛-inch screen oversize on the conveyor belt to the storage bins.

A new 12-mile road was constructed by Anaconda and the Bureau of Public Roads to connect the mine with Nevada State Highway 395. Transportation of the ore from the Leviathan mine to Weed Heights has been contracted to the Wells Cargo Trucking Company of Reno, Nevada. Trucks used by Wells Cargo are bottom-dump semi-trailers pulled with Diesel engines, hauling a net load of 22 tons. A fleet of 18 trucks operating on two shifts are used to haul the 1,500 tons of ore per day. About four hours are required for the round trip of 116 miles. At Weed Heights, Wells Cargo trucks dump into other trucks for transporting the ore to the crusher, or into a powered scraper which stockpiles the material to be used during the winter months.

Anaconda has a small camp at Leviathan consisting of a repair shop, office with assay facilities, three houses, 12 trailers, and several small cabins. A Diesel generating plant provides electricity for the camp. The community is also equipped with a water supply and sewage disposal system.

Isbell has a camp separate from that of Anaconda's. It is composed of houses, trailers, an office, and a large repair shop.

Due to the proximity of this project (approximately 65 air miles) to Isbell's general repair shop at Reno, Nevada, and the establishment of radio communications between Leviathan and the Reno shops, it is possible to minimize the on-site repair and parts facilities.

SULPHUR ORE is crushed and screened in plant shown at left. Undersize, minus-⅛-inch, is discarded. Part of the truck fleet is shown at right. Isbell Construction Company's repair shop and town are in the background.

MINING EQUIPMENT is serviced in the modern garage and in the pit as shown by the two top pictures. The pump house at the pit reservoir is shown at bottom left. The welding shop, part of garage, is at bottom left.

High Power Factor And Preventive Maintenance Reduce Operating Costs

At the time of opening the property there did not exist sufficient power in the Yerington district to accommodate the operation of a plant as large as that anticipated. Anaconda advanced to Sierra Pacific Power Company sufficient money to construct a new power line from Washoe, Nevada to Weed Heights, a distance of approximately 70 miles. The line was constructed at a cost of $650,000. This investment by Anaconda will be returned by a monthly rebate on the power bills submitted by Sierra Pacific.

Transmission voltage is reduced at the mine through a 7,500-kva transformer bank and is distributed throughout the plant and mine area at 2,300 volts. Seven distribution lines carry the power to the pit and plant. Two of these lines lead to the pit, one to the primary crushing plant, secondary crushing plant, shops and warehouse, acid plant, and the townsite.

Flexible Pit Power Supply

The two distribution lines to the pit are parallel; each 600 amp. capacity at 2,300 volts. The lines circle the outside of the pit making a very flexible power system. These lines leading to the pit are provided with an impedance grounding system for a high degree of protection against the hazard of dangerous voltages between the frame of the equipment and the earth, in case an accidental ground should occur in the system. Power from the main distribution lines enters a switch house, passes through an oil circuit breaker, and then travels to the shovel or drill through shielded portable cables.

Relay Cuts Down Time

Transmission lines leading to the various plants pass through a metal clad switch gear and from here, through oil circuit breakers, out to the various pieces of equipment. As a general rule all motors above 40 horsepower are of 2,300 volts. All pan feeders are driven by d-c stabilized shunt gear motors for better speed regulation. Conveyors and equipment in the crushing plants, except for the crushers themselves, are interlocked. If one piece of machinery stops, all other equipment behind it stops.

The 300-horsepower motors that drive the 7-foot short head cone crushers in the secondary crushing plant have automatic synchronization. The motors were designed to be tripped off the line automatically whenever the crusher is plugged. This caused considerable amount of unnecessary down time whenever minor or momentary plugs occurred in the crushers.

To overcome this delay, Mike Bisset, chief electrician, installed an eight-second time relay in each of the secondary crusher motor circuits. Now, whenever the motor speed lags, due to plugging in the crusher, the motor is taken out of synchronization and operates as a straight induction motor for a period of eight seconds. This allows the crusher ample time to clear itself of minor or momentary plugs. The motor then

regains speed and automatically again becomes a synchronous motor. The eight-second period is well within the safety limits of the motor. Should the plugging effect last for more than the eight seconds permitted by the relay, the motor is tripped off the line.

Synchronous motors were included in the original design for the secondary crushing plant to keep the voltage up and to increase the power factor. Anaconda pays a penalty for low power factor.

Loading and unloading bridges on the leaching vats and the crane at the precipitation launders receive power from copper T rails running along each side of the vats and launders. This voltage is supplied at 440 volts. An electro magnet used to load tin cans from the stockpile into the precipitation launders operates on about 300 amperes d-c supplied by a motor generator set.

Power Consumption

The average power requirements at the plant and mine and townsite amount to about 3,000,000 kw per month. An especially good power factor has been attained at the property due mainly to the fact that most of the motors are of the synchronous type. The power factor for 1954 to date averages 95.

The new power line and the existing Sierra Pacific line are connected in parallel. In case of trouble on one line, operations can be carried on from the line remaining in service.

Preventive Maintenance Pays

A large, well-equipped garage and a capable crew of mechanics can handle any vehicle repair job up to and including motor rebuilding. Sections of the garage consist of: an office, tool room and storage room, grease room (for pumping grease underground to grease pits in the garage), lubricating, repair section, rear-end and transmission shop, motor rebuilding shop, torque converter and pump room, front end section, tire repair section, and a welding shop. In addition to this, washing, steam cleaning, and painting are done in a separate building close to the garage. Sharpening and tempering of the churn drill bits is also done in a separate building located near the pit.

Periodic preventive maintenance is practiced at Weed Heights. Active records are kept for each individual piece of mobile equipment starting with the day it was delivered. Service report cards, as shown, have been prepared for different maintenance periods on all the major equipment. Equipment at the Leviathan mine is brought down to Weed Heights during the winter months and completely overhauled.

A machine shop equipped with lathes, milling machine, shaper, drill press, grinder, etc. has been able to handle all of the repair work that has been required. Work also coming under the supervision of the machine shop foreman includes the entire mechanical maintenance of the plant and townsite.

A large warehouse is required to handle the vast number of supplies needed for repair and maintenance. Quick 24- to 48-hour delivery by truck brings supplies from the cities where most of them are purchased. Orders can be phoned to Reno, Nevada during the day and a truck picks up these orders and leaves Reno each evening for the mine. Deliveries from Los Angeles, California, Salt Lake City, Utah and the San Francisco Bay Area require only 24 hours.

The warehouse is run on a perpetual inventory and average-cost basis. To aid in ordering supplies an efficient index has been compiled of the different manufacturers' catalogs. As an additional help, an index is now being prepared of the supplies being used, showing names and addresses of the manufacturers, maximum and minimum requirements, etc.

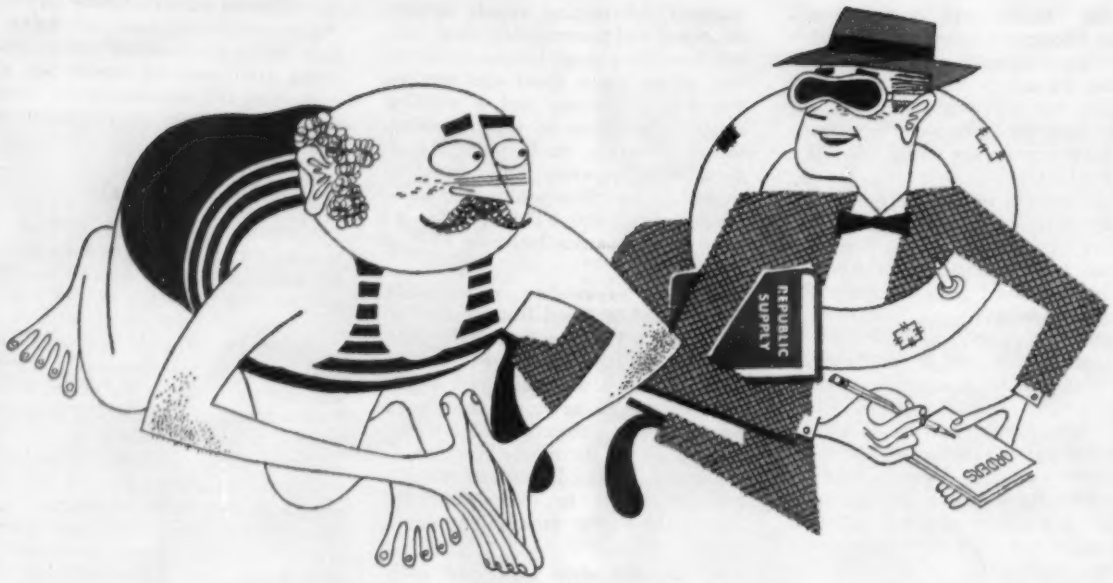
Communicate by Radio

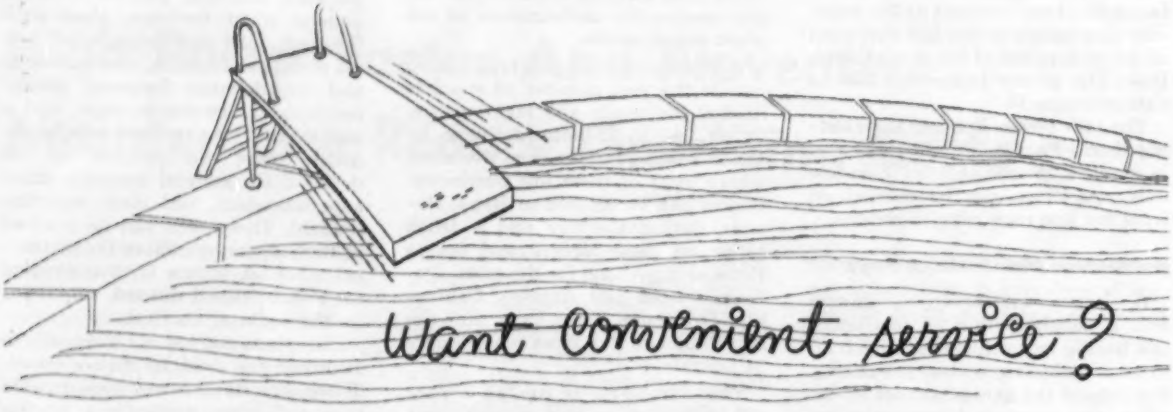
A short-wave radio system in service for the last 18 months makes for easier control of operations. The system is a 500-watt unit which is large enough to cover any dead spots (areas of poor transmission) which may be encountered in the pit and also to reach to Wabuska. A 90-foot sending and receiving tower is located in the townsite area.

Three dispatch units for governing and regulating calls are located in the garage office, machine shop office, and in the electricians' office. Other stationary units are installed at Wabuska and in the statistical office. Fifteen key mobile units are equipped with sets. These are used by the general manager, mine superintendent, plant superintendent, general pit foreman and chief engineer, pit shift foremen, powder foremen, general plant foreman, plant shift foremen, chief electrician, plant and pit electrical foremen, machine shop and maintenance foremen, garage foreman, pit mechanic crew, and a gas, oil, and lubrication truck. In addition, units are installed on the desks of the general manager, mine superintendent, and plant superintendent. These men can be reached at their desks by calling the statistical office. A buzzer is then pressed for the individual wanted, who turns on the radio at his desk.

Hand sets having a range of 1 to 10 miles are used by repair crews. These sets have saved considerable time and labor, particularly for the electricians when installing the various control panels in the plant.

PREVENTIVE MAINTENANCE is important. Left to right are the men who direct it: M. H. Bisset, chief electrician; R. K. Owen, storekeeper; J. J. Hyland, machine shop foreman; and W. M. Cross, garage foreman.





LET REPUBLIC SUPPLY YOUR INDUSTRIAL NEEDS!

Republic isn't exactly a "supermarket" but you might be amazed at the variety of products and services Republic Supply's to basic industry...to the mining industry, to construction, utilities, refineries and to the oil fields—to the chemical and process industries, and to many others. Republic's products and services are backed by experience and the facilities of two large warehouses, five sales offices and 9 field stores.

Moral: Let REPUBLIC SUPPLY your industrial needs. Wherever you are and whatever you do, you will do better with Republic Supply's friendly, helpful service.

* * * *

THE REPUBLIC SUPPLY COMPANY

REPUBLIC RS SUPPLY CO

Main offices in Los Angeles & San Leandro. Phones—Los Angeles: RAymond 3-2511, PArkview 8-7151; San Leandro: LOckhaven 2-0414, Enterprise 1-1060

Pipe, valves and fittings • abrasives • shop supplies and tools • rigging materials • mechanical rubber goods • machinery • oil field supplies

An independently owned and operated company serving Western industry

ACTIVITIES OF U. S. MINING MEN

Phillip T. Peterson, manager of J. R. Simplot Company's Talache Mines at Atlanta, Idaho, was appointed manager of the firm's Colorado Uranium Division March 1. He will maintain headquarters at Norwood, Colorado. Also appointed to the uranium division were **Don Ferguson**, staff engineer, and **S. A. Robinson**, exploration engineer, both formerly with Simplot's Boise, Idaho, office.

Peter Joralemon, superintendent of mines and director of New Park Mining Company, will retire from the Utah mining firm July 1. He plans to join his father, **Ira Joralemon**, in San Francisco, California, in consulting work.

Arthur J. O'Connor, general manager of Consolidated Coppermines Corporation, Kimberly, Nevada, is now a vice president for the firm. Named to the office by the company's board of directors, Mr. O'Connor has been general manager at Kimberly since 1949. Before joining Consolidated Copper, he was employed by the Nevada Consolidated Copper Company, predecessor of Kennecott Copper Corporation's Nevada operations.

Philip T. Peterson, former manager of the Talache Mines, Atlanta, Idaho, has been named manager of J. R. Simplot's Colorado uranium division. His headquarters will be at Norwood, Colorado.

James C. Perkins, general superintendent of the Black Rock Mining Company, Tempiute, Nevada, has resigned to devote his full time to private interests.

Robert H. Lane, geologist, and **Howard J. Husing**, mine surveyor, are two of the engineering staff members recently promoted by International Minerals & Chemical Corporation at Carlsbad, New Mexico. A new appointee to the mine department is **Adolph V. Mitterer, Jr.**, who will work in the capacity of junior engineer.

HARLEY A. COY (above), general superintendent of Tennessee operations, has been elected to the position of vice president of the American Zinc Company of Tennessee by the firm's board of directors. Mr. Coy has been connected with American Zinc since operations were first started in 1912. He served three years as chief engineer, and in 1915 was named superintendent of mines. In 1941, he was promoted to the position of general superintendent of Tennessee operations. Another appointment announced by the firm is that of WILLIAM BLACK (below). Mr. Black, assistant general superintendent, has been promoted to the position of manager of Tennessee operations. He has been with the company since 1923, serving as an underground mine laborer, shift boss, general mine foreman, chief mine engineer, assistant superintendent of mines, and superintendent.

William C. Keeley, president of Vanadium Corporation of America, has returned to New York from a tour of the company's operations on the Colorado Plateau.

H. Dodge Freeman has been named vice president of the White Pine Copper Company, subsidiary of Copper Range Company. Mr. Freeman will maintain headquarters at White Pine, Michigan, where construction of the White Pine mine project is nearing completion. He comes to the firm from the Peabody Coal Company, with which he served for twelve years in executive and management capacities.

Distinguished achievement medals from the Colorado School of Mines at Golden, Colorado, have been presented to six alumni of the school. They are: **Mark U. Watrous, Lester C. Thomas, Lynn W. Storm, Tenney C. DeSollar, Elmer R. Wilfley,** and **Jesse T. Boyd.**

Norman E. Hanson, administrative assistant to the president of Basic Refractories, Inc., Gabbs, Nevada, has been named to the "Governor's Mining Advisory Board" by **Charles H. Russell**, governor of Nevada. Reappointed to the board for two year terms were **Roy A. Hardy**, Getchell Mine, Inc.; **John C. Kinnear, Jr.**, Kennecott Copper Coporation; **George W. Mitchell**, Eureka Corporation, Ltd.; **P. G. Dobson**, Summit King Mines, Ltd.; **W. G. Emminger**, Nevada-Massachusetts Company, and **Paul Gemmill**, Combined Metals Reduction Company.

William R. McCormick, director of the Utex Exploration Company of Utah and active figure in the uranium industry in that area, has been named executive vice president and general manager of Standard Uranium Corporation. Assistant to Mr. McCormick will be **J. P. Wheeler**, who also serves as the firm's assistant secretary.

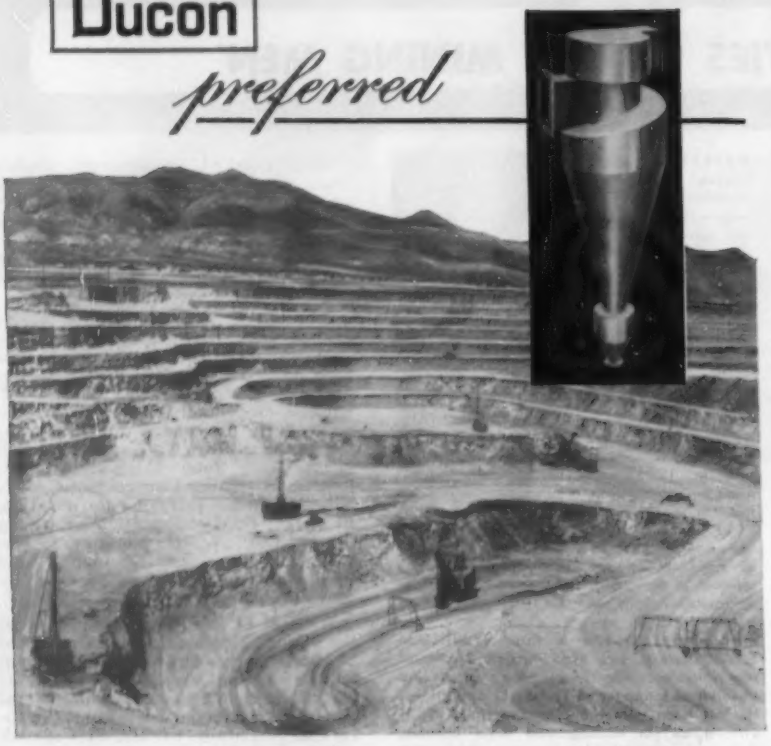
Robert Morris, formerly chief analyst for U.S. Vanadium Company at Uravan, Colorado, is in charge of the Minerals Assaying Laboratory, which opened recently in Grand Junction, Colorado. Parent company of the laboratory, which will be available to prospectors and operating miners alike, is Minerals Engineering Company of Grand Junction.

J. M. Hoff, president of the Willow Valley Mines, Nevada City, California, has tendered his resignation to the company's board of directors. Succeeding Mr. Hoff, whose retirement was necessitated by illness, is **Fred Galeno.**

Five leaders in the uranium industry were cited for their "service to mankind" by Sigma Tau Sigma, national social service society, at a special ceremony in Los Angeles, California, May 28. The awards were presented to (left to right) BLAIR BURWELL, president of Minerals Engineering Company, Grand Junction, Colorado; CHARLES STEEN, president, Utex Exploration Company, Moab, Utah, who was unable to attend the ceremony; WALTER BILICKE, president, Engineers Syndicate, Ltd., Hollywood, California; SHELDON P. WIMPFEN, manager of the Grand Junction Operations Office, U.S. Atomic Energy Commission, and VERNON J. PICK, president of his Pick Mining Company, Grand Junction. The "Servio Hominibus" awards were made to the men "for the individual contributions to social progress through the development of the uranium industry." Presentations were made by Arthur G. Horton, founder and national vice president of Sigma Tau Sigma, at the group's annual national banquet which was held at Los Angeles City College.

Ducon

preferred



. . . for Dust Collection in

Anaconda's Yerington Mine Operations

Ducon Cyclone Collectors are used for dust control on the various operations at Anaconda's Yerington, Nevada Copper Leaching Plant. Crushing and related operations are the starting point in the preparation of many raw materials for subsequent use, whether it be for metallurgical, chemical or construction. From exploratory drilling through the various processes to the end product, Ducon Dust Control Equipment performs the vital service of product recovery and dust control in the many material processing operations.

Write today for full descriptive literature.

the name in dust control

Canadian Branch: THE DUCON COMPANY of CANADA, Ltd.
275 James Street North, HAMILTON, ONTARIO

THE Ducon COMPANY

147 EAST SECOND STREET, MINEOLA, N.Y. • Sales Representatives in Principal Cities

CYCLONES • CENTRIFUGAL WASH COLLECTORS • TUBULAR CLOTH FILTERS • DUST VALVES

WILLIAM DISTLER, formerly underground mine superintendent at the Miami Copper Company operation in Arizona, has been named to the post of assistant mine superintendent for Climax Molybdenum Company, Climax, Colorado. Mr. Distler has had 15 years experience in mining engineering and had been mine superintendent at Miami since 1950.

Floyd Sherry, Mackay, Idaho mining man, was elected president of the Minerals Resources Association of central Idaho. He succeeds **Howard Sims** of Salmon, Idaho.

W. L. Zeigler, general manager, Pend Oreille Mines and Metals Company, Metaline Falls, Washington, has been awarded an honorary doctorate degree in science by the University of Idaho. Mr. Zeigler was mill superintendent for Hecla Mining Company in Wallace, Idaho, for 24 years before joining Pend Oreille in 1948.

Lloyd G. Henbest, U.S. Geological Survey staff member, has been named author of the best paper published during 1952 by the Society of Economic Paleontologists and Mineralogists. The formal presentation was made in St. Louis, Missouri for the paper entitled "Significance of Evolutionary Explosions for Diastrophic Division of Earth History."

J. A. Rooney and **B. W. Armgost** have received promotions at the Orinoco Mining Company, U.S. Steel Corporation subsidiary. A civil engineer with the firm, Mr. Rooney was named chief engineer, while Mr. Armgost has become assistant to the president.

William J. Welch, manager of the metal department of National Lead Company, has been elected vice president and executive committee member for the New York firm. Mr. Welch joined National Lead in 1916. Since then he has served in various capacities with U.S. Cartridge Company and Morris P. Kirk & Son, Inc. in Los Angeles, California, subsidiaries of National Lead.

Several personnel changes have been announced by Climax Molybdenum Company, New York, and its subsidiaries. They include the shifting of **Carroll L. Wilson** from the presidency of Climax Uranium Company to the post of Director of Industrial Development for the parent company. Succeeding Mr. Wilson as president of Climax Uranium is **John H. White, Jr.**, president of Climax Molybdenum Company of Pennsylvania. Mr. White will make his headquarters at Grand Junction, Colorado.

William J. Harris has joined the staff of the Battelle Institute, Columbus, Ohio, as a consulting scientist. For the past three years, Dr. Harris has been executive secretary of the Minerals and Metals Advisory Board of the National Academy of Science and the National Research Council, Washington, D.C. Recipient of the American Institute of Mining and Metallurgical Engineers' Mathewson Medal in 1950, he is the author of numerous technical papers, principally on notch-toughness of steel and transformations in steel.

ACTIVITIES OF INTERNATIONAL MINING MEN

A. K. Chanda, secretary of the ministry of production, is board chairman for Hindustan Steel, Ltd., which will manage a new steel plant at Rourkela, India. Also elected to the board at a recent meeting in New Delhi, India, were **S. N. Mazumdar**, managing director; **K. C. Mahendra, S .R. Vasavada, F. C. Badhwar, K. R. K. Menon,** and **S. Bhoothalingam. H. Seyboth** and **W. C. Reuter** are representing the German interests of Krupps and Demag on the board.

The National Society of Mining and Petroleum in Peru has announced its officers for the coming year. Named president was **Alberto Brazzini.** Serving with him are **Eduardo Portaro,** first vice president, and **Ernesto A. Baertl,** second vice president.

Stanley V. Burr has been appointed president and managing director of Burrex Mines, Ltd., in British Columbia. Other officers of the company are **J. M. Hayes,** vice president; **Peter Tymoko,** secretary; **Colin G. Charron,** assistant secretary.

Frank A. Ayer, internationally known mining consultant, has opened new offices at 21 East 40th Street, New York City, New York.

J. H. D. Hargrave, superintendent of development, metallurgical division; **E. A. Mitchell,** superintendent of the smelting department, and **J. D. Hartley,** assistant superintendent of the zinc department are among recent promotions at The Consolidated Mining & Smelting Company, Trail, British Columbia.

Raymond R. Beard, in charge of the U. S. Atomic Energy Commission's Latin American activities, has returned to Lima, Peru from a visit to the United States. Formerly general manager of Mauricio Hochschild's mining enterprises and later assistant manager of the Patino tin and tungsten interests, Mr. Beard has spent more than 25 years in Latin America, chiefly in Bolivia and Peru.

Members of the Malayan Tin Industry (Research and Development) Board have been announced in Kuala Lumpur. They are: **J. T. Chappel, D. T. Waring, F. C. Calvert, N. Cleaveland, H. S. Lee, Woo Ka Lim, G. F. Gripper, A. D. Dawson,** and **Inche Abdul Aziz.**

W. L. Long, president of the Tungsten Institute and vice president and general counsel of the Tungsten Mining Corporation, Haile Mines, Inc., and Manganese, Inc., has returned from a tour of tungsten mines in Brazil and Argentina. Upon his return to the United States Mr. Long reiterated his belief that maintenance of a strong domestic mining industry for the production of strategic metals "is imperative in these times of increased tension." Commenting on his trip, Mr. Long said that he was impressed with the fact that "Argentina has the same enlightened policy of Government floor price purchase programs designed to develop its strategic mining industry."

H. W. A. Sommerlatte, consulting engineer for the London and Scandinavian Metallurgical Company, London, has completed a tour and investigation of various chrome deposits on the Great Dyke of Southern Rhodesia. The British firm also has chrome interests in Turkey.

Dean F. Frasche, consulting engineer for the Union Carbide and Carbon Corporation of New York, recently conferred with Portuguese officials in Lisbon in connection with proposed company operations along the shore of Mozambique. Following his Lisbon visit, Mr. Frasche proceeded to South Africa.

Joseph Oris, Belgian mining engineer, is now with the large gold producing firm of Societe des Mines d'Or de Kilo-Moto, in the Belgian Congo.

Lewis B. Hardner, vice president and director of Elder Gold Mines in Canada, was elected president of South American Gold & Platinum Company in New York. He succeeds **Newton C. Marshall,** who has retired after 40 years with the company. Elected executive vice president was director **Robert C. Stanley, Jr.,** who is president of Bevcourt Gold Mines in Canada and a director of several other Canadian gold mining companies.

A. F. Banfield, official of the New York firm of Behre Dolbear & Company, has been examining glass sand deposits in Alberta, Canada. Another member of the company, **Parke A. Hodges,** recently returned from Cuba. He is currently stationed in Colorado.

Dale Patty assumed the resident managership of Gold Placers, Inc. and Alluvial Golds, Inc., Alaskan mining companies, early in June.

William Charles Bell, of Stewarts and Lloyds, Ltd., Great Britain, who has been awarded the American Iron & Steel Institute Medal, is the first person from outside the United States to attain this honor. The medal, awarded for "papers of special merit and importance," was presented to Mr. Bell for his "Review of European Operating and Technical Practices." Mr. Bell is managing director of Stewarts and Lloyds Iron and Steel production.

SANGAD TAILANGA, Thailand's inspector of mines, is studying underground mining methods in the Washington-Idaho mining districts. On a year's visit to the United States, the mining engineer is currently assigned to the U. S. Bureau of Mines' Northwest mining division, Spokane, Washington. Although most mining in Thailand is now limited to placer operations of tin and tungsten deposits, Mr. Tailanga says that his country intends to develop an underground mining industry.

A. D. C. Bayley, recently superintendent of development for Consolidated Mining and Smelting Company's metallurgical division in Trail, British Columbia, is now assistant consulting metallurgist for Anglo-American Corporation of South Africa, Ltd. His headquarters for the new post are at Kitwe, Northern Rhodesia.

Robert G. McKelvey, mine superintendent of Lamaque Mining Company, was promoted to general superintendent for the British Columbia firm. Succeeding him as mine superintendent is **Arthur Foley,** formerly assistant to the post.

Piotr Jaroszewicz, vice-premier, has replaced **Ryszard Niesporek** as Polish minister of mines. Mr. Niesporek was shifted to the position of vice-minister. Named as vice-premier was **Stanislaw Lapot.**

Frank L. LaQue, Canadian authority on corrosion, has succeeded **Thomas H. Wickenden** as vice president of The International Nickel Company, Inc. and manager of its development and research division. Mr. Wickenden will continue his association with the firm as a consultant on special projects. Assistant managers of the division will be **O. B. J. Fraser** and **Donald J. Reese.**

FOREIGN PERSONNEL

Senior appointment recently announced in New York for the International Nickel Company of Canada, Ltd. include **Ralph D. Parker,** assistant vice president, who was made general manager of Canadian operations; **Walter C. Kerrigan,** vice president of International Nickel Company, Inc., who was named assistant to the president, and **Herbert G. Fales,** who assumes the post of assistant to the chairman.

Frank S. Simons, director of the U.S. Geological Survey in Lima, arrived in Peru during March.

Norman Henry Fisher, Australian geologist, is assisting the Bolivian Mining Corporation in making a geological survey of Bolivia's mineral resources and reserves in existing mines. He is carrying out the assignment as part of the United Nations Technical Assistance Program. Mr. Fisher is chief geologist of the Australian Bureau of Mineral Resources.

Arthur A. Brant, Newmont Mining Corporation official, has been in southern Peru in connection with the exploration and development program Newmont and Cerro de Pasco Corporation are conducting jointly at the Cuajone porphyry copper deposit. Forty-five diamond and churn drill holes were completed at the project during 1953.

A. H. W. Busby, superintendent of engineering and research development for Consolidated Mining and Smelting Company of Canada at Trail, British Columbia, has accepted a position as assistant consulting mechanical and electrical engineer for the Anglo American Corporation of South Africa.

These rolls, hard-faced when new with Coated Tube Stoodite, have been in operation 3 months, crushing extremely hard river rock. When hard-facing is re-applied beads are slightly separated, areas between being filled on successive applications.

IMPROVING CRUSHER EFFICIENCY with Stoody Hard-Facing

All crusher rolls lose sizing efficiency because of uneven wear. As roll centers become worn, a gap develops between them, permitting oversize material to pass through. With continued wear, crusher adjustments cannot compensate and efficiency is lost.

BALANCING WEAR RESISTANCE

The answer is use of two Stoody Hard-Facing Alloys of dissimilar wear resistance. Roll centers are protected with Coated Tube Stoodite; outside areas with Stoody 21. *This procedure concentrates extra wear resistance where most needed, at the same time saves money by using a lower cost alloy on edges!* Net result is balanced wear, flatter roll surfaces and more uniform sizing of material over life of the rolls.

HARD-FACING KINKS

Always skip-weld to avoid overheating. New hard-facing beads can be applied alternately between former deposits.

After repeated welding, manganese rolls may deteriorate from application of heat, causing hard metal to spall. This can be prevented by applying a layer of Stoody Nickel or Moly-Manganese to the parent metal after 3 or 4 hard-facing applications. If crusher rolls are carbon steel, use Stoody Build-Up.

IMPROVING GRIP

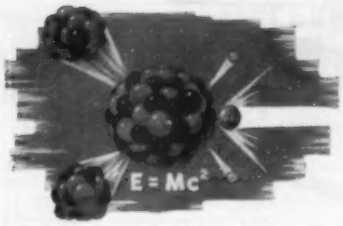
A better grip is possible if one roll is hard-faced with a series of spaced stringers, forming corrugations. Follow the same bi-metal technique for balancing wear.

By repeating hard-metal applications, as required, three times normal life is not unusual for crusher rolls. This and other crusher hard-facing techniques are described in the Stoody Hard-Facing Guidebook.

This illustration shows method of spacing stringer beads on one roll to improve grip. Coated Tube Stoodite is applied in center area, Stoody 21 on outer edges.

Ask your Stoody dealer for a copy (See the yellow pages of your phone book) or write direct!

STOODY COMPANY
11969 East Slauson Avenue
Whittier, California



FISSION FACTS

Monthly Roundup of Mining News In the Atomic Energy Field

Wyoming Uranium Finds To Be Checked This Year

This year should bring the true picture of Wyoming uranium deposits. While mineralization has been found in many sections of the state and hundreds of claims staked, there has been no significant production except in the Black Hills area where Homestake Mining Company found and developed a profitable ore body last year.

Major mining companies have acquired claims in Fremont County (central Wyoming) and both private and United States Atomic Energy Commission core and non-core drilling are now underway to test the discoveries made in late 1952 and whose evaluation was delayed by the extreme winter climate of the area.

The New Park Mining Company, Utah lead-zinc-silver producer, has exercised its purchase option on nearly 50 claims of the Lucky Mac group in the Gas Hills area of eastern Fremont County. The claims were staked by Neil McNeice of Riverton, president of the Lucky Mac Corporation. New Park plans an immediate exploration and mining program. Other large mining companies who recently have had geologists and engineers in the area include Climax Uranium Company, United States Vanadium Company, and the United States Smelting, Mining and Refining Company.

In southern Fremont County, Metallics Unlimited, a Reno, Nevada company, has optioned four claims in the Crooks Gap area from Lawrence Bergston and plans immediate production.

The North American Uranium and Oil Company has reportedly leased 4,000 acres of potential uranium mining area from the Wolf Land Company of Cheyenne, Wyoming. The land is northwest of Lucky Mac claims. The land is classified Wyoming State Land and was leased from the state by the Wolf Land Company shortly after announcement of the Lucky Mac discoveries.

Homestake Starts Second Utah Uranium Development

The Homestake Mining Company has awarded a shaft-sinking contract to the Centennial Development Company for a 600-foot vertical shaft at Homestake's recently acquired La Sal Mining Company claims in San Juan County, Utah. The claims have been thoroughly prospected by surface diamond drilling. They are northwest of Charles Steen's Mi Vida mine and the Cal Uranium Company mine. Shipments from the Mi Vida have reached 300 tons per day and first Cal Uranium ore was produced a short time ago.

At Homestake's Little Beaver claims south of the Mi Vida mine, the Centennial company is making rapid progress in contract driving of the 3,000-foot adit to the Little Beaver ore body which also has been prospected by surface diamond drilling. See MINING WORLD, April 1954, page 33.

New Portuguese OEC Plans Increased Uranium Mining

The Portuguese government has created an Atomic Energy Commission (Junta de Energia Nuclear) with headquarters in Lisbon. The Commission will promote the prospecting and mining of uranium deposits, and the beneficiation of ores in mineral concessions in Portugal and Overseas Provinces, either in cooperation with Portuguese or foreign groups, or, if necessary, directly. The Commission will also control the sales and export of fissionable minerals. Preliminary work will be carried out in conjunction with the Institute for High Culture in Lisbon.

It is expected, the Atomic Energy Commission will propose new legislation governing prospecting for and mining of uranium ore deposits. Prospecting for uranium and thorium deposits has been closed in the entire Portuguese Empire since 1949.

Engineer Jose Frederico Ulrich, formerly Minister of Public Works, has been appointed as President of the Commission.

Uranium Is Everywhere

SOUTHERN CALIFORNIA has gotten into the uranium boom in a big way with claim locations and prospecting active in Kern, Ventura, and San Bernardino counties. Areas of particular activity are in the eastern half of Kern County where uranium has been discovered in vein-type deposits in both granite and volcanic flow rocks. One area is east of San Bernardino in the San Bernardino Mountains where surface prospecting is very active and has resulted in staking of many claims between Big Bear Lake and Yucca Valley.

Following publication of airborne radioactive anomaly maps by the United States Atomic Energy Commission, activity has centered at four places in Kern County. One is four miles northwest of Mojave, another is southwest of Searles Station, a third in the Lancaster-Rosamond area just north of the Los Angeles County line, and the fourth, west and northwest of the Tropico gold-silver mine.

The Ventura County claims have been located in the Cuyama Valley (of Richfield Oil Company fame) in the vicinity of Frenchmen's Point where gypsum and alabaster have been mined intermittently for years. First claims in the area were filed in 1928, but apparently not for uranium. In mid-May an additional 55 claims were staked for uranium.

MESA COUNTY, COLORADO is the scene of long known and important uranium mines in the Calamity, Monogram, and Gateway districts. Climax Uranium Company has been an important producer for the last few years and has been active in expanding its holdings. It has applied for an additional 52 leases (claims) under provisions of the United States Atomic Energy Commission's Circular No. 7 covering leasing on certain areas where mineral and oil and gas rights are in conflict.

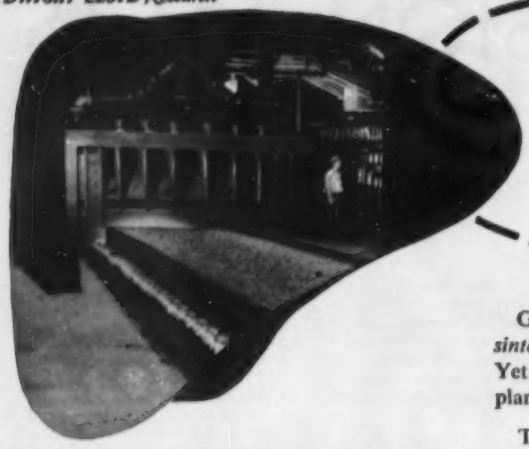
FIRST CLAIMS IN NEW YORK for a uranium discovery have been made for mineral rights covering two-thirds of Camp Smith (a National Guard camp and training area) 35 miles north of New York City. An independent prospector has filed 34 40-acre claims with the New York State Land Board. If permission to mine is granted by the Board a 30-month lease with a two percent royalty will be made under terms of the law.

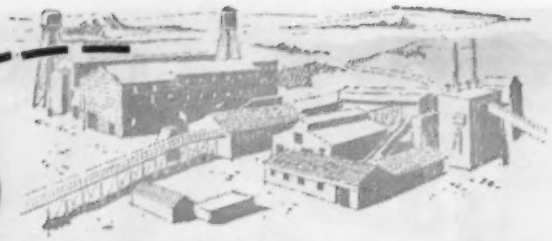
MINING OF URANIUM ORE has started in Australia's Northern Territory. The first ore was mined at Fleur de Lys in the Brock Creek district 110 miles south of Rum Jungle. The ore was shipped to the mill of Territory Enterprises Pty. Ltd. at Rum Jungle. The mill will be in production months ahead of schedule and output is expected to be double that originally planned. The mill will produce a copper flotation concentrate as a byproduct. Copper was mined in the area 50 years ago.

RIVERTON, WYOMING is the headquarters for the B. S. & K. Development Co. which is making plans to mine the first uranium ore in central Wyoming. The firm has 16 claims under lease and has located 50 more about 40 miles west of Shoshoni. Surface stripping with bulldozers and core drilling operations are underway.

NO PART OF THIS PAGE MAY BE REPRODUCED WITHOUT WRITTEN PERMISSION.

Revolution in Sintering Through **DWIGHT-LLOYD** *Research*





PUTS MORE HEART IN YOUR 5%

Getting a good sinter, at low cost, is more dependent *on the sintering machine* than any other part of the plant installation. Yet this vital heart of the installation represents only 5% of your plant investment.

The new Dwight-Lloyd machine was designed to add even greater value to this important 5%. It incorporates many engineering advances which improve the sinter quality and reduce production costs, establishing new standards for output and quality.

The constant improvement of the Dwight-Lloyd machine has been the objective of years of research by our engineers. That's why it represents the finest in modern, economical sintering.

Write for detailed information.

FEATURES OF NEW DWIGHT-LLOYD MACHINES

*Rowen Windbox Seal**—Completely eliminates air leakage between pallets and windboxes, resulting in a more uniform product, greater production and lower operating costs.

*Compound Discharge Curve** — Eliminates spillage, controls pallet drop, reduces pallet wear.

Upper and Lower Windboxes —for up-draft or down-draft operation.

Roll Feeders—Assure an even distribution of charge on pallets.

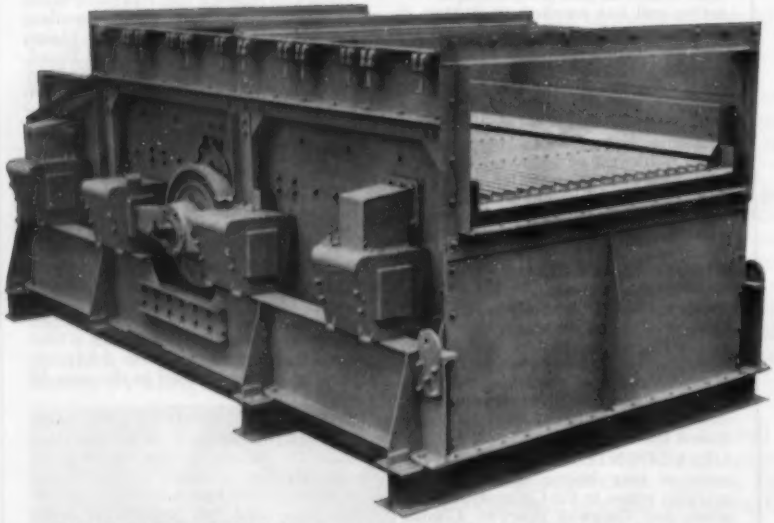
*Patented

DWIGHT-LLOYD, Inc.

DIVISION OF SINTERING MACHINERY CORPORATION

155 SINTER AVENUE, NETCONG, N. J.

TYLER TY-ROCK SCREENS USED AT YERINGTON



Tyler Type F-800 Ty-Rock Screen with Air Seal Enclosure and Rod Deck.

Nine Tyler Ty-Rock Screens are in use at the new Yerington Plant of Anaconda Copper Mining Co., Weed Heights, Nevada.

The vibrating body of the Ty-Rock is full-floating on shear rubber mountings with absolute freedom to develop maximum screening action. The rubber mountings also act as insulation against transmission of vibration to the building.

Tyler Ty-Rocks are preferred by the world's largest mines for their proven high capacity, reliability and efficiency.

THE W. S. TYLER COMPANY, CLEVELAND 14, OHIO

Woven Wire Screens • Screening Machinery • Testing Sieve Equipment

New Lithium Discoveries In Southern Rhodesia

Several deposits of petalite ($Li_2O.Al_2O_3.6SiO_2$), Southern Rhodesia's principal lithium ore, have been discovered in the Enterprise tin belt only 16 to 20 miles from Salisbury, Southern Rhodesia. Exploratory and quarrying operation was immediately started at the Patronage mine. A substantial deposit is also reported from the Casa Ventura farm, while other occurrences are being investigated. Petalite occurs in these in fairly large bodies in pegmatites, which usually display a certain amount of zoning.

At the same time, new promising discoveries were made of eucryptite ($Li_2O.Al_2O_3$) on farms Thorn Vlei and Lonly Park in the same area. The only other occurrence of eucryptite was that from the Al Hayat mine, a giant pegmatite at Bikita, Fort Victoria district. Eucryptite is extremely similar to quartz but can be readily distinguished by a crimson coloration under ultraviolet rays.

Southern Rhodesia's total production of lithium ores for the first three months in 1954 amounted to 8,780 tons, valued at £49,408. This was seven times more than during the same period of 1953. The production is expanding rapidly. The bulk of the ore is exported to the United States, United Kingdom, and Europe, but manufacture of exportable quantities of lithium salts was started recently at Gwelo, the first on the African continent. Future production of lithium salts is also planned in the Bikita area.

USGS Continues Aid For Peru's Mineral Survey

In line with the United States government's continuing program of aid to Peru in expansion of her mining industry, the United States Geological Survey will undertake an investigation of manganese, tungsten, and other metals in the department of Puno this year.

Working under the auspices of the Foreign Operations Administration, the U.S.G.S. has been active in Peru since 1947. Its present staff is composed of three geologists—Frank S. Simons, party chief, Robert F. Johnson, and Richard W. Lewis, Jr. Their investigations are made in close cooperation with a survey group of engineers from Peru's Instituto Nacional de Investigacion y Fomento Mineros. The group presently includes Guillermo Abele, Eleodoro Bellido, Alberto Manrique, and Sigfredo Narvaez.

Because of Peru's vastness of mineralized areas and the tremendous number of known mines and prospects, the scope of most investigations is limited to certain metals and a systematic plan of study by individual provinces is followed. To date, most of the surveys have been occupied with deposits of lead and zinc because these deposits afford the best opportunities in Peru of being worked by operators with small capital, and the program is designed specifically to aid the small miner. Since the larger companies have for years been actively exploring for copper, only casual attention has been given to this metal by the survey.

In the field, all known prospects are visited, and the more meritorious are examined in detail and even sampled. To avoid duplication of work already performed by other engineers, little work is done in the vicinity of the large operating mines which have received adequate geologic study. Particular efforts are made to obtain observations on the regional geologic setting of ore deposits, the data for which is largely lacking in the present descriptions of Peru's mineral localities. Aerial photographs have aided in this work in some areas.

To date, the campaign of investigation is essentially completed for the departments of Cajamarca, La Libertad, and Ancash; the northern portions of Lima, Pasco, and Junin departments have been partially completed. Although publication of the results has not yet been made, all information is freely available to any mining man who calls at the local office, except in cases where the claim owner has requested that the information be kept confidential.

Summer Plans Announced By Idaho Mines' Bureau

Four field parties conducting geological surveys and mineral resource projects have been scheduled by the Idaho Bureau of Mines for this summer. Concentrating on the south-central, eastern, and southeastern sections of the state, the groups will be headed by faculty members from the University of Idaho College of Mines.

Fluorspar mineralization and base metal deposits in the southern part of Custer county's Bayhorse district will be studied by one group. A brief reconnaissance of recent tungsten discoveries in the county and near Mackay in Butte county will also be made.

The manganese deposits near Lava Hot Springs will be evaluated by one group as will the manganese resources of Lemhi county. In addition, study will be made of copper, silver, lead and zinc deposits near Leadore and Gilmore, and another project will be extensive study of the Salmon city area, including metallic and non-metallic mineral resources.

Other projects include further studies on the beneficiation of phosphate rocks and clays, work with phosphorus chemicals in mineral flotation, and exploring the possibility of combining zinc, antimony, and silver with aluminum in alloys.

Venezuela Looks to More Production of Sulphur

Increased sulphur production is of intense interest in Venezuela, according to an abstract released by the Asociacion Minera, Venezolana. The report, prepared by Engineers Luis F. Calvani and Mario Beroes, supplements a recent study by the Pan American Union on mineral deposits in Latin America.

Two million tons are estimated to occur in the Costmora sulphur deposits, 20 miles from the seaport of Carupano. The deposits are centered in the Municipio El Pilar in the Benitez district. This was reported by Asociacion technicians, who have prospected to a depth of six meters there. Other exploration projects in the area, which first started producing sulphur 70 years ago, have been conducted by United States technicians who drilled to a depth of 100 feet, and the Venezuela Sulphur Corporation C.A. which is continuing its operations.

Diamond Mine Installs Two-Mile-Long Conveyor

A two-mile conveyor system, the longest on the continent of Africa, will soon be installed in the fabulous Williamson diamond mine at Tanganyika, East Africa, to help speed up the production of diamond ore in which the precious gems are found.

Designed by engineers of Hewitt-Robins, Inc., the conveyor system will carry diamond ore at the rate of 300 tons an hour from the mouth of the mine to a new processing plant, currently under construction two miles away, where the diamonds and waste will be separated. The conveyor system was designed by engineers in the Hewitt-Robins subsidiary, Robins Conveyors (S.A.) Ltd., at Johannesburg, South Africa, and the machinery is now being manufactured in the company's Johannesburg plant.

When the new plant and conveyor system are put into operation, it is estimated that the handling of diamond-bearing ore will be increased four-fold over present capacity. The conveyor system will replace a fleet of 15-ton trucks which frequantly bog down in the mud and cause serious interruptions in production.

The diamond deposit, located on a desolate plain famous for big-game hunting, is said to be potentially the richest the world has ever known. It was discovered in 1940 by Dr. John Thorburn Williamson, a former Canadian geologist who has spent years prospecting for African gems.

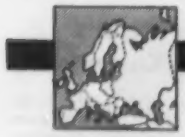
Brunswick's Development Program Moves Along

Development of the New Brunswick property of Brunswick Mining and Smelting Corporation is proceeding at a rapid rate. Construction of a 150-ton test mill is under way on a site close to the Austen Brook ore body which will be an open-pit operation. Power transmission to the site has been completed, and the plant is expected to begin test runs early in 1955. The mill will produce lead and zinc concentrates which will be stockpiled until regular mine production begins.

The Anacon-Leadridge ore body will be an underground operation. A collar for the preliminary shaft has already been sunk and cemented, with erection of the headframe about completed. The three-compartment shaft is to be sunk to 400 feet, with levels at 200 and 350 feet. About 6,000 feet of lateral work and raising is planned to develop the 1,200-foot-long ore body on both horizons. This shaft is being developed near the north end of the ore body as a future auxiliary opening. The final production shaft will be 1,500 feet deep and will be sunk later.

The project is an amalgamation of properties held by Brunswick, Anacon Lead Mines Ltd. and Leadridge Mining Company, a subsidiary of St. Joseph Lead Company. Brunswick's original ore body was the Austen Brook. The Anacon-Leadridge deposit was acquired through an agreement signed last year with Anacon and Leadridge.

Close to 50,000,000 tons mill-grade zinc-lead-silver ore has been indicated by drilling and eventual production is planned for 5,000 tons per day.



EUROPE

THE NETHERLANDS—A trade agreement between Russia and the Netherlands provides for Russian exports to Holland of 40,000 tons of manganese ore, 20,000 tons of chromium ore, and 15,000 tons of iron. Recent sales of platinum to the United States from the Netherlands have led to investigations regarding the source of the metal since The Netherlands is not a platinum producing country. It is now reported that the metal arrives in Holland in the form of crude impure lumps from Russia. It is subsequently refined and then exported.

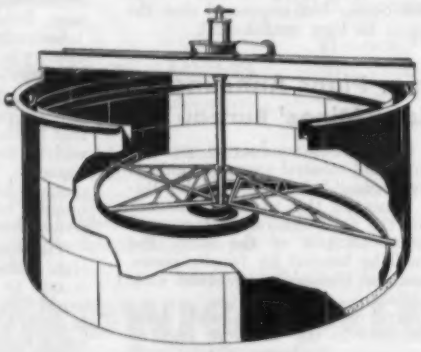
SWEDEN—At Utoe in the Baltic Sea, the *Stellberg Company* is sinking a shaft to 1,200 feet in order to develop ore bodies that have been idle for hundreds of years. Geophysical surveying and diamond drilling have indicated that it is a low-grade iron ore and also contains low-grade lead and zinc. Plans are to produce 200,000 tons of iron ore and 60,000 to 80,000 tons of zinc-lead ore per year.

NORWAY—Norway's largest aluminum plant, located at Sunndalsora in the western part of the country, has gone into production with an initial output of 40,000 tons per year. It may eventually be increased to 50,000 tons without additional facilities. Norway's present annual output is about 52,000 tons. Only 44 furnaces are now in operation; the rest of the 264 furnaces will go into service when additional power becomes available from the Aura hydroelectric plant which is under construction. The power plant is scheduled for completion in 1955 and will have a capacity of about 500,000 kilowatts. Much of the £12,500,000 which the plant is estimated to have cost has been provided by the United States Foreign Operations Administration. The loan will be repaid in deliveries of aluminum over a 10-year period.

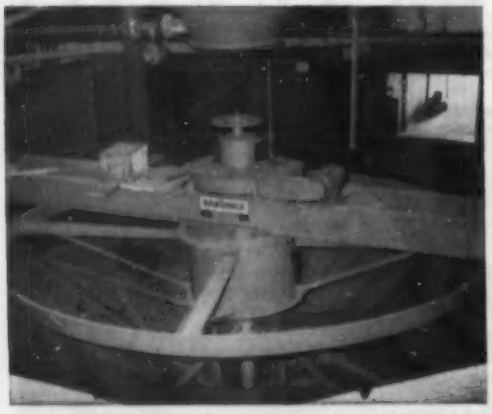
GREAT BRITAIN—The *Lead Development Association* has been formed under the sponsorship of the leading commonwealth lead producers. A non-profit association, its object is to extend the knowledge of lead in its various uses. Until now, the only such organization has been the *Lead Industries Development Council* which confined its activities to those connected with lead sheet and lead pipe. This group will now become the *Lead Sheet and Pipe Council* and will be an associate member of the new organization. Offices will be in London.

AUSTRIA—The *Unterlaussa* bauxite mine, operated by the *Ranshofen Aluminum Works*, produced 17,400 metric tons during 1953, compared with 14,400 tons during 1952. 8,700 tons were shipped to Bavaria where processing of the bauxite took place for later re-shipment to the Ranshofen aluminum mill. An increase in the quality of Unterlaussa bauxite is expected as mining reaches greater depths. Test drilling has shown that the pyritic content of the ore decreases rapidly at increasing depths.

USSR—The Soviet Union shipped to Great Britain during 1953 27,600 tons of manganese ore, 94,000 ounces of platinum metal, 20,900,000 ounces of silver. These shipments represent a value of £10,000,000 (sterling). With gold exports from the USSR to England added, the sum reached £35,000,000, and £50,000,000 with the value of chromium ore and iron added.



"AUTO-RAISE"
THICKENER



Lower unit of a 35' Hardinge superposed two-compartment Thickener at Barvue Mines, Ltd., Barraute, Quebec, handling zinc concentrate.

One of the distinctive features of Hardinge Thickeners is the "Auto-Raise" driving mechanism, which automatically lifts the scraper away from an overload or obstruction in the tank bottom—eliminating costly breakdowns and delays. Another optional feature is the double-spiral scraper which removes settled solids from the tank bottom in one revolution. Bulletin 31-D-3.

HARDINGE
COMPANY, INCORPORATED

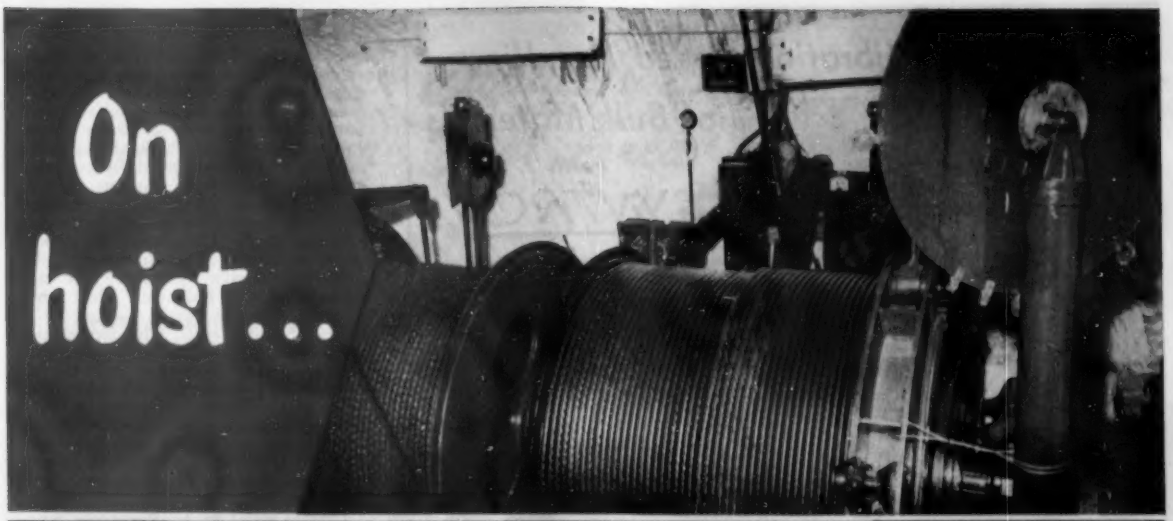
YORK, PENNSYLVANIA • 240 Arch St. • Main Office and Works

New York • Toronto • Chicago • Hibbing • Houston • Salt Lake City • San Francisco

AFRICA

FEDERATION OF RHODESIA AND NYASALAND—Southern Rhodesia, Northern Rhodesia, and Nyasaland have formed a federation of states to be called "Federation of Rhodesia and Nyasaland." In the future, MINING WORLD will list news from these three countries under the one heading.

FEDERATION OF RHODESIA AND NYASALAND—A progress report from *Bancroft Mines, Ltd.* Northern Rhodesia) shows that a concentrator flowsheet has been drawn up, based on metallurgical testing of drill hole cores. Shaft sinking operations have started and a concrete headframe has been designed in such a way that the main headframe can ultimately be erected while sinking is proceeding and there will be little delay in changing over to production hoisting. No. 1 shaft planned for a first sink of 1,460 feet had reached 342 feet by the end of March, and No. 2 shaft, which will be sunk to the same level, had reached 55 feet.



lower cost-per-ton because

Edwards Wire Rope stays on the job

WIRE ROPE that stays on the job with less down-time for replacement means safer operation and assures you lower cost-per-ton of material moved.

There's an Edwards Wire Rope built to give you long, trouble-free service on each specific mining operation, from hoisting to scraper work.

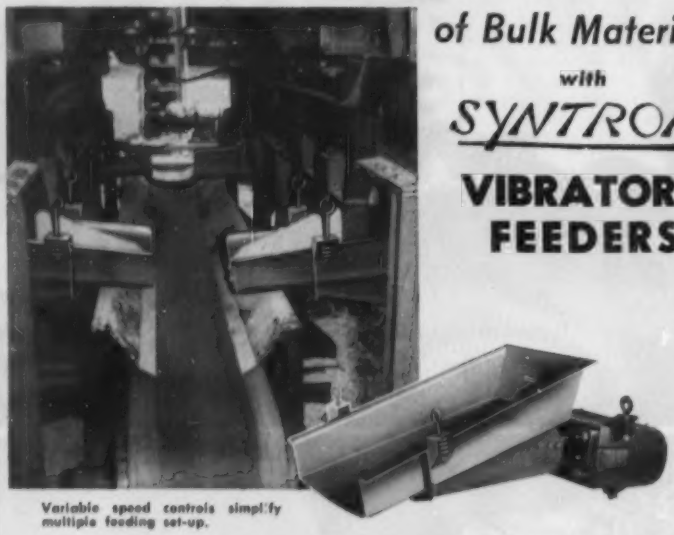
Technical Field Representatives are at your service on request, to help you select the right rope for every job from the complete Edwards line.

EDWARDS WIRE ROPE

E. H. EDWARDS COMPANY

General Office: SOUTH SAN FRANCISCO, CALIF., Los Angeles, Houston, Seattle, Portland

Controlled Vibration Speed Handling of Bulk Materials with SYNTRON VIBRATORY FEEDERS



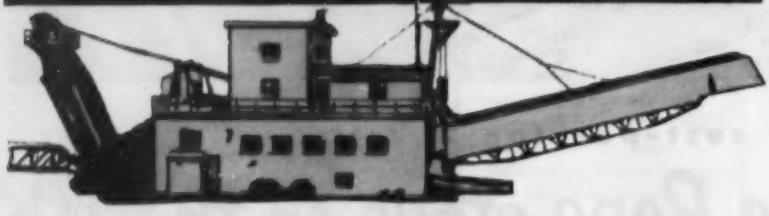
Variable speed controls simplify multiple feeding set-up.

Installed in groups for capacity feeding of several different materials on blending operations—or singly for handling large tonnages, Syntron Feeders assure accurate, finger-tip controlled feeding of most materials from heavy ores to fine powders. Electromagnetic—no mechanical wearing parts.

WRITE FOR COMPLETE TOOL CATALOGUE—FREE

SYNTRON COMPANY
166 Lexington Ave. Homer City, Penna.

FOR SALE



6 cu. ft. DREDGE (5,000 cu. yds. per day)

HULL
44'4"x86'x7' with 4'x46' pontoons added each side.

ENGINES
2-200 hp Atlas Diesels, 514 RPM. One drives pumps. One for belt drive to main drive pulleys.

DIGGING DEPTH
24' below water.
74-6 cu. ft. buckets.

GENERATOR
94 KVA

PUMPS
One 8", one 10".

GOOD OPERATING CONDITION AVAILABLE IMMEDIATELY
Complete Specifications On Request
WRITE WIRE PHONE

DULIEN STEEL PRODUCTS, Inc.
of Washington
9265 E. MARGINAL WAY · LANDER 6000 · SEATTLE 8, WASH.

INTERNATIONAL

SOUTH WEST AFRICA—A number of massive sillimanite deposits in Namaqualand, recently discovered by R. G. Niemoller, are to be quarried shortly by him for the requirements of the *General Refractories Ltd.* of Sheffield England. A mineral survey conducted by consulting engineers, Sir Digby Burnett and Dr. K. P. Chikara of Salisbury, Southern Rhodesia, proved substantial reserves of excellent grade sillimanite. The deposits occur in certain zones on the boundary between massive quartzite and mica gneisses of the Basement schist series. The outcrops are usually marked by extensive boulder beds. The largest pure sillimanite boulder weighed 140 tons. The quarrying operation and the deposits were recently inspected for future large-scale planning purposes by R. A. Kirkby, managing director of General Refractories, the largest refractory materials group in Europe. The firm also operates the *Kyanite Development Project* in Ncheu, Nyasaland.

MOZAMBIQUE—A discovery of a substantial crystalline corundum field is reported from the Revue River area, 45 miles from Vila Pery. Several claims have been staked by Miguel Claro de Fonseca. The new find is situated in the Government Inchope tin reserve. Trial washing of extensive eluvial rubble beds yielded excellent results. Mozambique has several corundum deposits mainly in the Tete area, which is also for the time being a government reserve. It is estimated that during the war years several thousand tons of crystalline corundum have been handpicked from the surface rubble beds there and exported to the United States. The decrease in demand during the post-war years caused their closure.

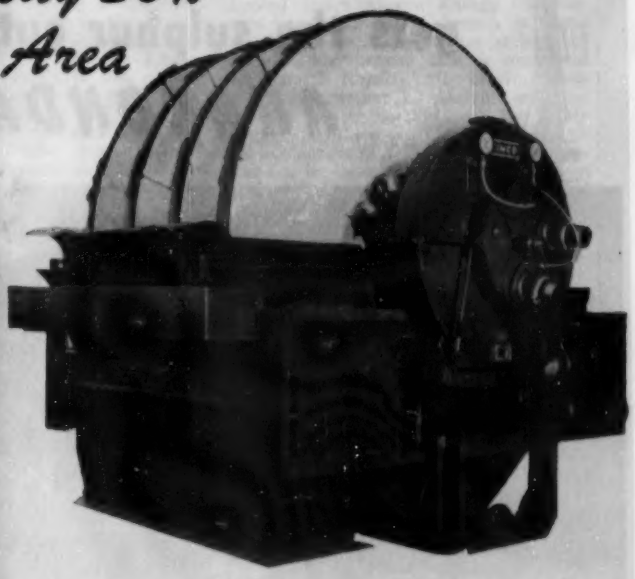
FEDERATION OF RHODESIA AND NYASALAND—*Rhodesia Asbestos Ltd.*, which is controlled by the *Johns-Manville Corporation*, is investigating the *Ruscon* group of claims at Lower Gwelo (Southern Rhodesia) over which the company has an option. Chrysotile cross-fiber occurs in the claims in several lenticular bodies. The claims are owned by a small syndicate from Fort Victoria, from which Rhodesia Asbestos acquired the *Shamala* asbestos claim holdings last year.

TANGANYIKA—*Williamson Diamond Ltd.'s* new plant now being installed is expected to come into production soon. It will increase the quantity of diamondiferous gravel treated to 7,500 tons in 24 hours. Diamond production in 1953 totalled 170,679 carats, valued at £2,100,000.

THAILAND—The Thai government has decided to establish a tin smelter to which all tin output of the country would be directed. Plans for a smelter were proposed two years ago but the project was dropped at that time. Thailand presently exports her tin to smelters in Malaya, Singapore, and the United States.

MALAYA—*Hong Kong Tin Ltd.* produced 47.75 tons of tin during the first two months of 1954. At the beginning of March the dredge started to dig the

Increase Filter Capacity 20% Per Square Foot Area



Actual operating data from important mining companies show that Eimco Agidisc filters improve the recovery of concentrates from fast settling slurries.

On a copper concentrate the improvement in tonnage was 20% over the conventional disc on a square foot of filter area per hour basis. The moisture content of the cake was 1½ to 2% less on the Eimco Agidisc and approximately ½ of 1% less than on a drum type filter operating on the same feed.

Write for more information on Eimco Agidisc filters to the Eimco Corporation, P. O. Box 300, Salt Lake City 10, Utah.

Above: An Eimco Agidisc — 8' diam. x 4 disc. Below: An Eimco 8' diam. x 10' Agidisc dewatering a fast settling slurry. Note the smooth, evenly distributed cake.

THE EIMCO CORPORATION

Export Offices: Eimco Bldg., 52 South St., New York City • Salt Lake City, Utah—U.S.A.

Branches • New York, 51-52 South Street • Chicago, 301 So. Hicks Road, Palatine, Ill. • El Paso, Texas • San Francisco, 637 Cedar St., Berkeley, Cal. • Birmingham, Ala., 3140 Fayette Ave. • Duluth, Minn. • Kellogg, Ida.

B-29

You Can't Beat An Eimco

PORTADRILL BHD

REG. U.S. PAT. OFF.

gets the sulphur out for ANACONDA

Photo shows Anaconda's Leviathan Sulphur mine, Leviathan County, California, in the Sierra Nevada mountains. 19 million tons of overburden must be moved by Isbell Construction Co., contractors for Anaconda Copper Co.

It takes a dependable drill for blast hole operations at Anaconda's Leviathan operations. A PORTADRILL BHD owned and operated by the Isbell Construction Co., Reno, Nevada, is the primary equipment used in drilling blast holes in the removal of over 19 million tons of overburden. The Portadrill patterns 6″ holes 36′ deep and spaced 18′ on a round-the-clock basis for an average of 840′ per day. The dry cuttings are used for stemming the hole. Density of the overburden demands ¼ to ⅓ pounds of powder per ton for adequate fragmentation.

PORTADRILL Can Solve YOUR Vertical Hole Problem

There is a Portadrill designed for practically every vertical hole application from blast holes, underground exploration, mineral sampling, seismic or geophysical operation, shallow oil wells, water wells and other applications. A world-wide organization stands ready to aid in solving your vertical hole problem. Complete information available on request.

PORTADRILL

REG. U.S. PAT. OFF.

MANUFACTURED BY THE WINTER-WEISS CO.

2201 BLAKE STREET • DENVER, COLORADO, U.S.A.

dock where it will remain for about six months until the program for reconstruction and modernization of the dredge has been completed. This is expected to increase efficiency of the operation. During the last quarter of 1953 101.50 tons were produced.

INDIA—The government of Mysore state has organized a five-man committee to investigate ways of improving the mining industry in the state and increasing revenue from that industry. The committee will survey the present mineral wealth of the state and explore the possibilities of setting up manganese and ferromanganese plants.

SOUTH KOREA—The *South Korean Tungsten Corporation* is reported to be planning to send a group of representatives to various nations in search of new market possibilities for its concentrates. Exports of tungsten ceased completely following fulfillment of a recent contract to supply the United States.

JAPAN—The Japan Mining Association is concerned about overproduction of zinc and nickel within the country, because of lessening domestic demand as a result of the government's deflationary and tight-money policies. The association estimates demand for zinc in 1954 at 90,000 tons and production at 100,000 tons. *Mitsubishi Metal Mining Company* and *Mitsui Metal Company* have started operation with new equipment to produce 560 tons a month, increasing monthly production of 1,200 tons to 1,700. The Mikkaichi refinery, operated by *Japan Mining Company* and *Japan Netrogen Mining Company*, expects to begin operation this summer with a monthly output of 500 tons.

PAKISTAN—A French mining expert is assisting Baluchistan States Union officials in developing and operating mining projects in the BSU. He is in Pakistan under the United Nations Technical Aid Programme.

KOREA—A mineral assay laboratory has been built and equipped by the United Nations Korean Reconstruction Agency (UNKRA) and is now operating at Taejon. Erected at a cost of $160,000, it will provide the Korean mining industry with the most modern facilities for testing and analyzing minerals without expenditure of scarce foreign currency. Specifically it will assist in determination, analysis and standardization of Korean minerals, and will train and act as a consultant to Korean mineral technicians.

TURKEY—A Turkish chrome committee has been considering ways of reviving the country's chrome export trade. Until recently the United States had been the principal outlet for Turkish chrome, but now the U. S. has been filling requirements elsewhere.

NORTH AMERICA

ALASKA—The return of the summer season has brought a resumption in gold mining all over the territory. John Ogriz will again be operating the Ogriz-Steen dredge in the Ophir district. Bob Watkins will continue his mining operations on Faith Creek. J. R. Rambauds and Vernon Weaver have returned to their

property on Napoleon Creek, a tributary of the Forty-Mile River. Fred Parker is working his placer ground on Mastodon Creek in the Circle district which he has leased from the *Berry Dredging Company*. His partners in this operation have tentatively planned to mine in the Nome area this season. Caspar Ellengen, pioneer miner in the Circle district, has returned to Deadwood Creek. Andy Schwaesdahl and Joe Bayless are moving their mining equipment this season over to Benson Knoor's ground on Mascott Creek. Mascott is a tributary of the North Fork of the Koyukuk.

BRITISH COLUMBIA—Good grade lead-zinc-silver ore has been opened for a considerable distance by *Silver Hill Mines Ltd.* of Tulameen in a development raise to connect the mine's third and second levels, a distance of 450 feet. The vein has averaged between 4 and 5 feet in width. T. E. Blossom is secretary.

ALASKA – Douglas McKay, United States Secretary of the Interior, has ordered the opening of 192,000 acres of land in the Matanuska Valley for mineral leasing. The lands were originally withdrawn in 1935 for the benefit of the colonization project now administered by the Alaska Rural Rehabilitation Corporation. Portions of the withdrawn areas have been restored while other parts have been transfered to private ownership with mineral rights reserved for the government.

MANITOBA – *God's Lake Gold Mines, Ltd.* is continuing diamond drilling on its *Lynn Lake* nickel-copper property and an airborne electromagnetic survey is being conducted on a 315-claim group acquired earlier in the year in the Benjamin River district of New Brunswick. The firm has also acquired mineral rights on about 2,200 acres in the Oka area near Montreal which is considered to be a uranium-tantalum-columbium district.

ALASKA—The copper deposit discovered by John Pettybone near the MacLaren River has been sold by Mr. Pettybone and his partner, E. O. Albertson, to the *Alaska Copper Mining Company*. Mr. Pettybone, who will still take an active interest in development of the find, believed that the operation of the property was too large an undertaking for any one but a major company. An analysis of samples taken has shown as much as 45 percent copper in a vein 10½ feet wide.

ONTARIO—*Pronto Uranium Mines Ltd.* has commissioned *R. M. Way & Company Ltd.* of Toronto to design a 1,000-ton-per-day mill for its operation in the Blind River area. The mill will be modern in every respect, and readily capable of expansion to 1,750 tons. Present plans call for operation by September 1955. The large-scale underground preparation program will start as soon as construction of the access road from Highway 17 to the shaft site is complete. The underground program is planned for completion by August 1955.

BRITISH COLUMBIA—Development work at the *War Horse* mine near Kimberley has been resumed by *Thomas Consolidated Mines, Inc.* of Spokane, Washington, after a winter shutdown. Diamond drilling is expected to delimit mineralization indicated by a hole put into the hanging wall of the main adit last December. David E. Watson of Spokane is treasurer.

QUEBEC—*Quebec Nickel Corporation* reports that detailed scintillation and geiger survey in the vicinity of the first radioactive drill hole made on the firm's Calumet Island property indicated a radioactive zone 300 feet wide by 1,000 feet long. The continuity of two major pegmatitic dykes has been established within the zone which is still open at both ends and strikes northeast and dips southeast. Quebec Nickel is also flying in a hoist and compressor to it *Gordon-Werner Lake* property on northwestern Ontario, where shaft sinking has resumed. The 40-foot-deep, three-compartment shaft will be continued to initial depth of 300 feet where nickel, copper, precious metal ore bodies outlined in previous surface drilling will be explored.

ONTARIO—Camp construction has been completed at the property of *Algom Uranium Mines Ltd.* and shaft sinking has started. Diamond drilling development both the Quirke and Nordic ore bodies continues to be satisfactory.

JAMAICA—The first shipload of alumina left Kingston for Kitimat on the west coast of Canada in May. The 11,000-ton cargo was refined from local bauxite in the new plant of *Alumina Jamaica, Ltd.*, a subsidiary of the *Aluminum Company of Canada*. The plant is already being expanded in order to supply the 20 or more shiploads of alumina per year required to supply Alcan's various operations, including Kitimat.

PERU—Following preliminary studies made earlier by a temporary party, the *United States Atomic Energy Commission* has established a branch in Lima which will be continued for at least 18 months. The present staff is comprised of Kenneth Rogers, party chief; Dennis Ryan and Robert L. Akright, who are working in conjunction with the newly formed *Comision Atomica del Peru*. Although details of their investigations cannot yet be revealed, the party has been making reconnaissance examinations and some detailed studies of rare metal deposits. They have also been giving valuable assistance to individual mine operators and prospectors in testing minerals for radioactivity with Geiger counters and scintillometers available at their office, and in facilitating information regarding modes of occurrence of uranium ores.

PERU—In southern Peru near the *Toquepala* deposit, the *Cerro de Pasco Corporation* is continuing intensive exploration of the *Cuajone* enriched-blanket, low-grade copper deposit. Four churn-drill and three diamond-drill rigs are said to be in operation, with a work personnel of about 200 men. The company is also interested in the *Antamine* copper property located about 95 miles northwest of the town of Cerro de Pasco. The ore body is smaller than Cuajone but of somewhat higher grade.

CHILE—The United States government has signed a contract with the *Kennecott Sales Corporation* for delivery of 36,000 tons of Chilean copper to the U.S. national stockpile. Kennecott Sales, a subsidiary of *Kennecott Copper Corporation*, acted as agent for the Central Bank of Chile in the transaction. This concludes negotiations by the U.S. for the purchase of 100,000 tons of Chilean copper. Earlier the government had

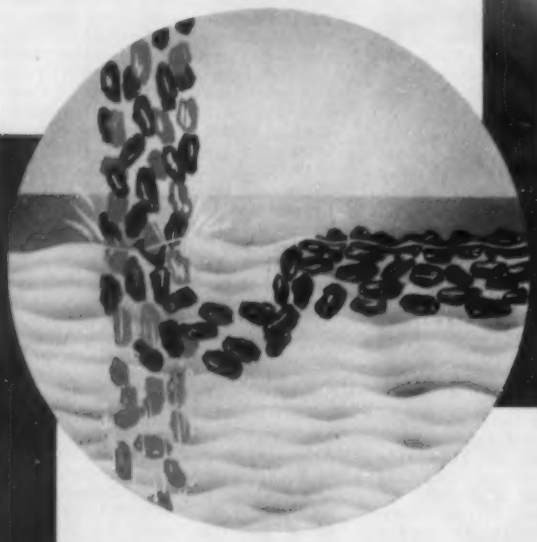
Hixon Resumes Canadian Placer Operations

Hixon Placers, Inc. has resumed development work at its property on Hixon Creek in the Cariboo mining district of British Columbia after a winter shutdown. Last season about 70,000 cubic yards of material were hydraulicked. (A part of the operation is shown above.) A cut was driven in a southerly direction and widened. Tests were made to determine the grade of the gravel in the southeast and west sections of the deposit, and, because a portion of the gold was much heavier, the firm believes that it is nearing the center of the channel. This season work will include opening of the channel to the south side and determining the bottom of the channel. Also planned for the new season is construction of an additional flume to carry tailing to the head of the lower falls; provision for increasing water supply in the operating pit which requires larger and increased pipe lines; and further testing of the area. Harry W. Hargood is president.

have you investigated

HEAVY-MEDIA SEPARATION

on your mill feed?



Today 164 Heavy-Media Separation plants are concentrating 25 minerals in 21 States, Alaska and 26 foreign countries. Plants range from prefabricated units treating 5 tons per hour to custom-built installations with a daily capacity of 25,000 tons. Now being successfully beneficiated are such diverse minerals as: Coal, Iron Ore, Zinc Ore, Lead Ore, Lead-Copper, Copper, Gypsum, Tungsten, Pyrite, Brucite, Dolomite, Potash, Diamond Ground, Gravel, Barite, Chromite, Andalusite, Magnesite, Lead-Zinc Ore, Tin Ore, Fluorspar and Garnet.

We offer you the benefit of our long experience with Heavy-Media Separation as a preconcentration process in conjunction with flotation and other recovery methods, as well as to make a finished concentrate on ores previously considered too low-grade for profitable treatment.

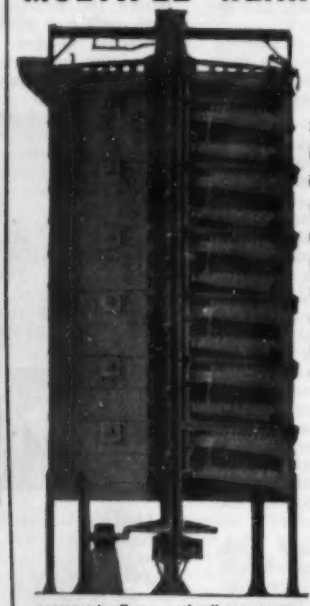
Cyanamid Field Engineers stand ready to work with you in improving the metallurgy of your mill. On request, the Cyanamid Field Engineer nearest to your mill will call upon you.

AMERICAN Cyanamid COMPANY

MINERAL DRESSING DIVISION

PACIFIC FURNACE

MULTIPLE HEARTH FURNACE

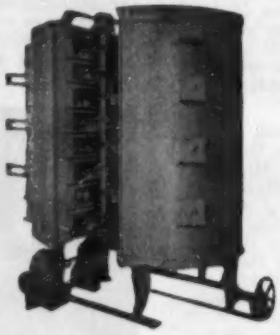


SIZES 8' 6" TO 22' 3" DIAMETER
NUMBER OF HEARTHS, 1-16

ROASTING
CALCINING
DRYING

ZINC ORES	QUICKSILVER
IRON ORES	MAGNESITE
COPPER ORES	LIMESTONE
TIN ORES	MOLYBDENUM
NICKEL ORES	BONE CHAR
LEAD ORES	DIATOMITE
SODA ASHES	LIME SLUDGE
FULLERS EARTH	MAGNESIUM
CARBON	CLAY GRANULES
PYRITE	ANTIMONY

SELENIUM
SEWAGE SLUDGE
LEAD CHEMICALS
METALLIC SLUDGES
FILTERING MEDIA
And for Numerous Other Materials



Pacific Laboratory Furnace

PACIFIC LABORATORY FURNACE

Manufactured in two sizes—36" and 54" inside diameters having 6-8-10 Hearths and include the same features as the commercial size furnace.

Pacific Furnacing Unit

NEW PACIFIC FURNACING UNIT

Higher shell height. Three gas burners. Provision for conversion to muffle unit. Small volume roasts at any desired temperature.

PACIFIC FOUNDRY COMPANY LTD.
Engineers and Metallurgists

1400 So. Alameda St. Los Angeles
3100 19th St. San Francisco
551 Fifth Ave. New York

signed a contract with *Anaconda Sales Company*, a subsidiary of *Anaconda Copper Mining Company*, for purchase of 64,000 tons of Chilean copper under the same terms of this second contract which called for a purchase price of 30 cents a pound, less certain allowances, for fire-refined ingot copper. Delivery storage points is included in the price.

PERU—*Cerro de Pasco Corporation*, for the second time in its history, held meetings of the Board of Directors in Lima and Oroya, Peru. All but one of the directors are residents of the United States and generally meet in New York. Part of their time in Peru included visits to the Oroya plant and the Paucartambo project.

BRAZIL—*Volta Redonda's* second blast furnace has gone into operation, increasing production capacity from about 470,000 tons of steel ingots a year to about 700,000. The new unit has a nominal capacity of 1,200 tons of pig iron a day, and supplements the first blast furnace which has a nominal capacity of 1,000 tons daily.

OCEANIA

NEW GUINEA—*New Guinea Goldfields Ltd.* reports that during March its Golden Ridges mill treated 3,824 tons to produce 1,177 ounces of fine gold and 1,471 ounces of silver; in April the mill treated 2,963 tons to produce 1,085 ounces of fine gold and 1,240 ounces of silver. In March 452 ounces of gold were produced from Koranga alluvials and in April 130 ounces.

NEW SOUTH WALES—Mine output of metal for the first two months of 1954 was as follows: cadmium 60 tons; copper 299 tons; gold 2,604 fine ounces; lead 18,433 tons; silver 679,442 fine ounces; sulphur 14,472 tons; and zinc 16,118 tons. In every case this was an increase over the corresponding period last year.

NORTHERN TERRITORY—*Brock's Creek Uranium N.L.* has received a proposal from *Rio Tinto Company Ltd.* for a 12-month option over certain of the company's mineral claims other than the one now being developed.

PHILLIPINE ISLANDS—Delays encountered in obtaining exchange licenses for importing of machinery and supplies has hindered erection of the mill by *Atlas Mining & Development Corporation* on its copper property at Toledo, Cebu Island. Production was scheduled to start in the middle of this year, but will now probably get under way late in the year. In addition to copper concentrates, the plant will produce approximately 250 tons of pyrite daily. Proven ore reserves are now set at 19,800,000 tons of 1.13 percent copper.

WESTERN AUSTRALIA—*Kalgoorlie Southern Gold Mines N.L.* is continuing deep drilling to test for possible southward repetition of the famous *Golden Mile*. A hole recently passed through zones of gold mineralization between 1,336 feet and 2,611 feet. The same hole (SE 6) has now penetrated to 2,974 feet in quartz dolerite greenstone, rock normally associated with gold-bearing formations at Kalgoorlie. Though to date

E. A. GODOY & CO., INC.
CUNARD BUILDING, 25 BROADWAY
NEW YORK 4, N. Y.

SALES AGENTS
REPRESENTING PRODUCERS OF
CHROME ORES IRON ORES
MANGANESE ORES

SuperDuty
DIAGONAL DECK
No. 6
CONCENTRATOR
TABLE

SuperDuty Easily Excels
in Concentrating Efficiency

In the separation of minerals, the SuperDuty Diagonal Deck Concentrating Table is superior in its treating range to any other table or process in common use today. Due to its design and construction it produces higher grade concentrates, leaner tailings and a reduced middling load for recirculation, while handling more tons of new feed per day.

For full information, send for Bulletin 118-B.

THE DEISTER CONCENTRATOR CO.
The Original Deister Co., Incorporated 1906
925 Glasgow Ave. Ft. Wayne, Ind., U. S. A.

Stockpiling Simplified

¾-YD SAUERMAN
SCRAPER HANDLES
ILMENITE AT 25 TPH

A Sauerman Scraper machine was selected to achieve profitable material handling by a large Eastern manufacturer of chemical products. Rapid shifting of the scraper about the 146' by 311' storage area is accomplished by a monorail and trolley system. The scraper is controlled by one operator who is in a safe location overlooking the storage area. He can reclaim the ore directly from the unloading trestle to the plant for processing, or he can stockpile the material until it is needed. Write for Field Report 224 describing this installation in detail. Find out how to reduce your storage cost.

Contact Sauerman now on the best system for your requirements. For more information write for *32 Tested Methods of Handling Bulk Material and Catalog E, Scraper Storage.*

SAUERMAN BROS., Inc.
538 S. CLINTON STREET, CHICAGO 7, ILL.

Sulphuric Acid Plant

(*Continued from page 64*)

tower. At the temperature of operation (100°), 93 percent acid is the most efficient drying agent.

Centrifugal Blower

Sulphur dioxide from the drying tower is drawn through the 58,000-cubic-foot-per-minute fan driven by a 1,200-horsepower motor. An analyzer, regularly calibrated with Reich testing apparatus, located on the inlet side of the blower, indicates SO_2 content of the gas stream. Controlled air addition maintains SO_2 at 7.8 percent for most efficient conversion. The blower maintains suction back to the freeboard of the Fluo-Solids reactor and pushes the gas through the convertors and absorption tower.

Gas from the blower is divided between two identical conversion units. Each unit consists of a primary and secondary convertor and three heat exchangers. Pellets of V_2O_5 bedded on the perforated plates of the convertors catalyze the exothermic reaction $SO_2 + \frac{1}{2} O_2 \rightarrow SO_3$. Heat liberated by the formation of SO_3 is used to preheat the incoming SO_2 gas stream flowing through the heat exchangers.

Preheat to 820°

Sulphur dioxide is piped through three heat exchangers in series, then enters the primary convertor. Sulphur trioxide produced in the secondary convertor flows through the first two heat exchangers and preheats the incoming SO_2 from 100 to 500°. The product produced in the primary convertor (75 percent of the SO_2 conversion occurs here) boosts gas temperatures to 820° in the third heat exchanger.

The heat of reaction in the primary convertor, raises the temperature from 820 to 1,120° in this unit. Recirculation back through the third heat exchanger drops the temperature to 820° before it enters the secondary convertor. A blower, furnishing cool air to an intercooler in the secondary convertor, dissipates most of the heat produced there to the atmosphere. Sulphur trioxide leaves the secondary convertor at 850°, and after passing through the first two heat exchangers, enters the absorption tower at 450°.

For temperature control, a thermostatically controlled valve automatically bypasses SO_2 gas to the primary convertor to maintain an entrance temperature at that point of 820°.

A propane furnace is used to furnish the heat necessary for starting the plant following a shutdown of more than 10 hours.

Absorption Tower

Sulphur trioxide produced by the convertors enters the lower part of the absorption tower where it is dissolved by the free water present to form sulphuric acid. Acidity is maintained at 98.4 percent H_2SO_4 by mixing a portion of the 93 percent acid.

In turn, 98.4 percent acid is recirculated back through the drying tower to maintain acidity there at 93 percent.

Pump tanks of 50 tons capacity used with each tower give adequate storage for solution recirculation between the absorption and drying tower. Operators using a hydrometer test the specific gravity of the solution in the drying tower to maintain proper acid concentration. A conductivity unit connected across a Wheatstone bridge indicates the acidity of the solution in the absorption tower enabling operators to meter acid between the two units to maintain a proper balance for most efficient drying and absorption.

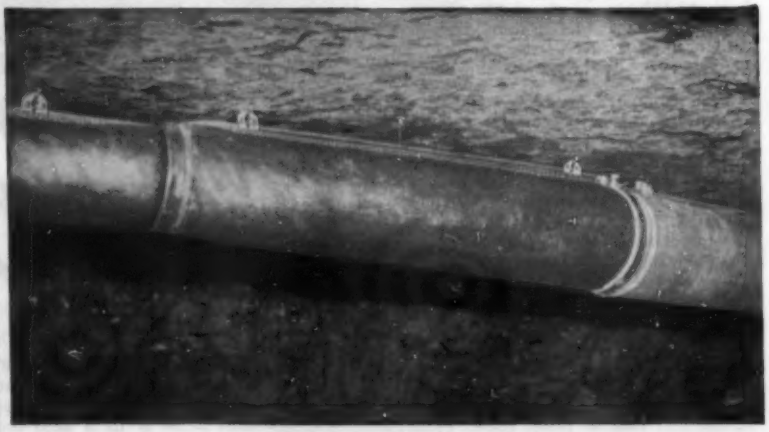
93 Percent Acid to Storage

Production is taken from the drying tower, and centrifugal pumps discharge from the pump tank to two 5,000-ton storage tanks. Provision is made to withdraw 98 percent acid from the absorption tower if desired.

At capacity, daily production is 450 tons of 100 percent H_2SO_4. Flues and pipes serving the Peabody scrubber and Cottrells are lead-lined. Steel piping handles dried SO_2 and SO_3 gas. Recirculating lines between the drying and absorption tower and the pump tanks are of cast iron.

SPECIFY

FLEXIPIPE® the quality ventilating tubing



Flexipipe is now available with Rope Seam Suspension *at no additional cost.* The newest, best, quickest suspension . . . eliminates special accessories and suspension wires . . . *all you need is a nail.* It equalizes strain on the tubing.

Flexipipe is efficient, serviceable, economical. Jute and heavy-duty grades available in a variety of lengths and diameters to meet your requirements.

Write for complete information and sample.

Bemis Bro. Bag Co.

111 No. 4th St., Box 23,

St. Louis 2, Mo.

WORLDWIDE PROFESSIONAL DIRECTORY

AGENCE MINIERE & MARITIME S. A.
2 rue Van Bree, Antwerp, Belgium
Sworn weighers, samplers, assayers of ores, metals. Agents for shippers to European ports, plants. Market surveyors, commercial advisers assuring sales direct to consumers.

HERBERT BANKS JOHNSON
CONSULTANT
Electrostatic Separation
Process Developments
520 East Ave. Rochester 7, N. Y.

LUNDBERG EXPLORATIONS LIMITED
Consulting Geologists & Geophysicists
Specialty Airborne Electromagnetic, Radioactive & Magnetic Surveys.
VICTORY BUILDING, TORONTO

JOHN F. MEISSNER ENGINEERS, INC.
Consulting Engineers
Conveyor Systems — Storage Methods
Crushing Plants — Ship Loading Docks
Materials Handling and Processing Plants
308 W. Washington St. Chicago 6, Ill.

HARRY J. WOLF
Mining and Consulting Engineer
Examinations—Valuations—Management
420 Madison Ave., New York 17, N. Y.
Cable: MINEWOLF Tel.: PLaza 9-1700

most gold occurrences cut by the Kalgoorlie Southern drill holes are of low grade, the existence of gold is considered significant and warrants further exploration. Any major occurrence of gold would have immense significance for Western Australia following recent oil discoveries.

NEW ZEALAND—*Arahura Gold Dredging Ltd.* at Arahura dredged 274,000 cubic yards in April to recover 802 ounces gold.

PHILLIPINE ISLANDS—The *Marinduque Iron Mines* report that stripping on the Maalimpayawan Area is in progress to expose a big portion of the ore body where open pit mining can be resumed to advantage. Underground work is proceeding on schedule and some of the drifts are being prepared for stoping. A magnetic survey is now in progress to determine and outline the ore bodies adjoining present workings.

QUEENSLAND—*Tableland Tin N.L.* at Mount Garnet produced 79.2 tons of tin concentrate from 217,000 cubic yards during March. The company is operating at Smith's Creek where 57,000,000 cubic yards are said to average 0.69 pound per cubic yard. Costs are in the vicinity of 15 pence per yard.

TASMANIA—In the half year to March 31, *Mount Lyell Mining and Railway Company, Ltd.* at Queenstown had a higher production record than in the same period of last year: ore treated, 740,457 tons, compared with 709,008 in the previous year; concentrates, 20,505 tons, compared with 14,635; blister copper, 4,692 tons, compared with 4,297 tons. The company is investigating the Jukes-Darwin copper field to the south of its present area. Present indications are that this is a large, low-grade deposit with sulphide mineralization.

PHILIPPINE ISLANDS—*Suriago Consolidated Mining Company* has lowered its millheads to 0.3 ounce per ton by mining out old upper stopes during the dry season. In mining out the ore between the 400 and 500-foot levels, several blocks in the edge of the ore body are being included, with the result that the grade is considerably reduced. At one time it would not have been economical to mine this low-grade ore, and it is possible now only because production costs have been substantially lowered. The company is attempting to extract all of the ore possible because the 500-level tunnels are becoming increasingly heavy and maintenance of them will, in time, become prohibitive.

WESTERN AUSTRALIA—Further activity at Mount Magnet is formation of *Hill 50 Consolidated N.L.* (There are now *Hill 50 Gold Mines N.L.*, *Hill 50 Extended N.L.*, *Hill 50 Consolidated N.L.*, and *Hill 50 Central N.L.*) Interest in the area follows continued good developments at Hill 50 N.L. where latest monthly returns are about 5,500 ounces of gold from 8,000 tons of ore (grade 13.3 dwt.). Also in the area is *Mount Magnet Development N.L.* which recently announced 9 dwt. values in its first drill hole on the *Morning Star* lease. This company will drill a number of offset holes at various depths by wedging the present hole, a procedure comparatively new in Australia.

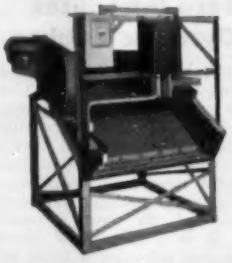
Specialists in Wet Gravity Ore Recovery, Sizing and Separating Equipment . . . since 1912

ORE CONCENTRATING TABLES
•
REVOLVING FEED DISTRIBUTORS
•
HYDRAULIC CLASSIFIERS
•
VIBRATING SCREENS

DEISTER

DEISTER MACHINE CO.
1033 E. WAYNE ST., FORT WAYNE 4, IND.

For Fine Mesh Screening
DRY, DAMP or WET

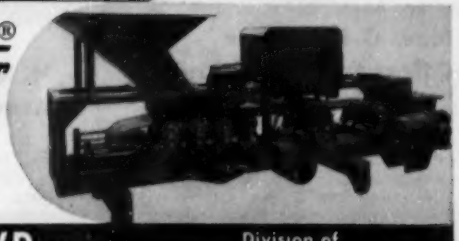


All Leahy Screens provide Differential Vibration that snaps oversize wedging particles loose 1600 times per minute. When dust is a problem, the totally enclosed model is recommended. For damp screening, FlexElex electric heating of the screen jacket insures full-time open mesh. For wet screening, CONCENCO Spray Nozzles assure top efficiency.
Send for Bulletin 15-J.

The DIESTER CONCENTRATOR CO. 925 Glasgow Ave., Fort Wayne, Indiana

1 Operation
with the ®
Transportofeeder
HIGH ACCURACY
FULLY AUTOMATIC
Write for Bulletin 301

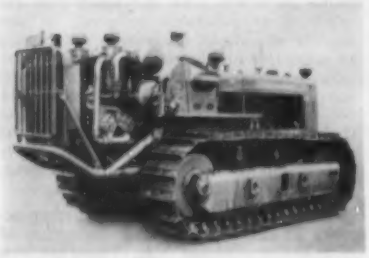
- FEED REGULATION
- INTEGRATED WEIGHING
- CONVEYING



DWIGHT-LLOYD, Inc. Division of Sintering Machinery Corp.
155 Sinter Avenue, Netcong, New Jersey

PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill, or smelter. This PEP section is MINING WORLD'S way of making available to you some of the finest current information on mechanization.

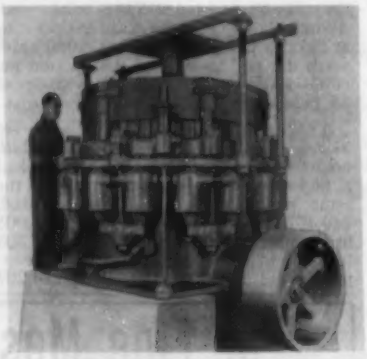


Old Tractors Get Added Life With New Le Roi Compress

Old tractors incapable of dozing or scraping operations can be converted with a Le Roi 600 CTM (compressor tractor mounted) to bring compressed air power to even the more remote areas. The 600 CTM is directly connected to the rear power take-off shaft of the tractor and lined up to the same close tolerances as the engine and compressor on a four wheel unit. Since the same engine powers both the tractor and compressor, additional economies are gained in fuel and maintenance costs. The Le Roi 600 CTM with side booms and twin wagon drill air feed assemblies of Le Roi-Cleveland SB30 or PL30 class, converts retired tractor into fast moving integral drilling units. For more information on how to add life to your old tractor with a Le Roi 600 CTM circle No. 63.

New G-D Mucker Offers Faster Loading

A new underground loader that has been designed to speed up the loading of mine cars also promises increased safety for the operator. The Gardner-Denver Model GD10 is equipped with a 4¼-cubic foot dipper and is reported to load cars at the rate of approximately 1¼ tons per minute. Safety features of the GD10 include a clean exterior design, low center of gravity, and high-flange wide-tread wheels that prevent rail jumping. In addition, both the traction motor and dipper motor controls, as well as the step plate, can be easily and quickly moved to either side of the machine so that the operator is always in the safest position. This feature is especially advantageous when two loaders are being worked side by side in the same heading. The GD10 also has many other important features such as: a self-cleaning bucket, easy lubrication, and controls placed for ease of operation. Circle No. 73.

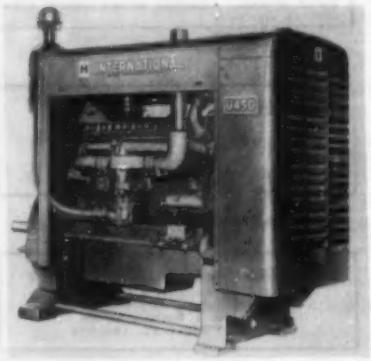


Nordberg Introduces New Gyradisc Crusher

Nordberg has introduced a new type of crushing unit known as the Gyradisc, built to supplement the renowned Symons Cone crushers. The Gyradisc provides a medium for still finer reduction than that heretofore obtainable in conventional reduction machines. The principle of reduction is different from that employed in most gyratory-type crushers. It is a process of alternately impacting and releasing a thick mass of material, resulting in the production of large tonnages of fine particles. Relatively large particles combined in an intimately mixed feed which is automatically distributed throughout the crushing chamber prevents packing of the mass and assures high output. The Gyradisc also has many other new and improved features. To learn more about this new crusher circle No. 60.

H. K. Porter Co., Inc. Acquires Pioneer Rubber

H. K. Porter Co., Inc. of Pittsburgh, Pa., recently announced the acquisition of Pioneer Rubber Mills Inc., of Pittsburg, Calif., largest manufacturer of industrial rubber products on the Pacific Coast. This new acquisition will become a part of the Quaker Rubber Corp., one of Porter Co.'s nine divisions. The Pioneer plant becomes the fifteenth factory in the Porter group.



International Harvester Has New Engine Models

Seven new six-cylinder carbureted models have recently been added to the International Harvester Co. power unit line. With the addition of these new engines, the International line now includes 18 Diesel, gasoline or gas models ranging from 16.5 to 200 net horsepower. These new units are the result of more than 45 years of IH engineering and manufacturing experience in the production of a complete line of heavy-duty engines for tractors, trucks, mining, construction, oil field equipment, and individual power unit application. Circle No. 71.

Michigan Expands Power Shovel Line

Clark Equipment Co. is expanding its line of "Michigan" excavators and cranes with two new ¾-cubic yard capacity power shovels, crawler and truck mounted. The development program for this equipment started more than three years ago, resulting in a completely new design. Michigan was the first shovel manufacturer to design and build a truck excavator as an integral unit. For further information on these two new shovels circle No. 70.

"ALLOY STEELS PAY OFF" is a book prepared by the Climax Molybdenum Co. to show some of the many general benefits which may be obtained by the replacement of carbon steel with a properly chosen alloy steel. Free copies of this book are available to those who write on their business letter heads to Climax Molybdenum Co., 500 Fifth Ave., New York 36, N. Y.

MICA FLOWSHEET: Denver Equipment Co. has published a new flowsheet on the concentration of mica. It is particularly concerned with separating the plus-1-inch; minus-1-inch to plus-½-inch; minus-½-inch to plus-¼-inch, and minus-⅛-inch material which can be further treated for very fine filler materials for paint, roofing and lubricants. For your copy circle No. 19.

DACRON FILTER CLOTH: The National Filter Media Corp. announces a new filter cloth woven from du Pont Dacron. This filter cloth shows excellent resistance to both acid and caustic attack at room temperature. It is strong, flex resistant and it stands up under severe abrasive conditions. For more information on its many advantages and uses circle No. 23.

ECONOMICAL PROSPECTING: The Prospecting Drill Div. of Hossfeld Mfg. Co. has available a new brochure on its prospecting and blast hole drill. This continuous feed drill powered with a five-horsepower gasoline engine drills 1½- to 2⅞-inch holes over 100 feet deep using standard detachable rock bits. Drill cuttings are recovered through the hollow drill steel enabling the hole to be accurately logged. The entire drill weighs only 1,300 pounds and can easily be disassembled into 100 pound units. Circle No. 48.

PUMP CALCULATIONS: A new booklet by The Allen-Sherman-Hoff Pump Co. illustrates how Hydrosealing works and how Hydroseal Pumps can help you. The booklet gives complete specifications for their many models of Hydroseals as well as explaining how to calculate the pump required. If you have a pumping problem this is a must. Circle No. 9.

CONTROLLED FEEDING: A catalog compiled by the Syntron Co. explains the use of their vibratory feeders in permitting accurate control of feeding rates. For your copy circle No. 47.

MAGNET SEPARATORS: A new type of magnetic separator for the mining industry has been developed by A. S. Thunes Mek. Vaerksted of Oslo, Norway. Already in operation in various parts of Norway, the new separator is being used for dressing and extracting iron ore by either the wet or dry processes and for the removal of unwanted ferrous content from other ores. The system is based on the use of a permanent magnet; the equipment is independent of electric current. Circle No. 37.

IMPROVED GRANBY MINE CAR: Sanford-Day Iron Works has designed and is building an improved Granby mine car. Briefly, this new S-D Granby car features outside frame undercarriage, outside spring truck boxings, automatic coupler mounting, stronger body, and all-welded design in which each member serves one or more purposes. For complete specifications and construction data circle No. 43.

JOY BLAST HOLE DRILL: The Joy Mfg. Co.'s Challenger is the largest hammer drill yet designed. It has a 5¼-inch hammer that is used to drill 4¼-inch holes through hardest rock formations to depths of more than 50 feet. This large drill has a 26-foot feed to cut the number of steel changes. Tractor-mounted on rubber tires with a portable compressor to furnish air for drilling, the Joy Challenger is the biggest large drill for hard rock drilling. Circle No. 44.

NEW AIR LEG FROM FINLAND: Reduce your drilling costs with a Tampella air leg and a Speed Finn Tio drill manufactured by Tampella Engineering Works of Tammerfors, Finland. This drill is said to have a number of outstanding new features such as a high number of fast rotating piston blows, light weight yet strongly constructed, and easy operation, all of which result in more footage per drill shift. Circle No. 49 for complete information.

CLOTH BAG DUST COLLECTOR: Pangborn Corp. announces the availability of a bulletin describing the Unit-Type CN cloth bag dust collector. This bulletin tells how dust control for all types of finely divided dry dusts can be provided for smaller volume applications at low equipment and installation costs. It points out how the collector was designed for indoor use, permitting clean air to be discharged inside the plant; a practice which results in a distinct savings where air is heated or cooled. Circle No. 20.

QUICK-LOCK HOSE COUPLINGS: A newly revised bulletin has just been announced by the LE-HI Division of Hose Accessories Co. It describes and illustrates in detail the LE-HI line of QUICK-LOCK Hose Couplings for various applications of service and also how they can be used in connection with the line of LE-HI Air Valves for the safe control of compressed air. Circle No. 16.

FLOW METERS: Catalog 2320 describes all types of flow meters made by Minneapolis-Honeywell's Industrial Division. It includes indicating, recording, integrating and controlling instruments of both evenly graduated and square root types, as well as area meters and differential converters. Also included is a section on flow approximations and installation information. For your copy of this 56-page catalog circle No. 17.

LOCATING URANIUM: A new catalog by Precision Radiation Instruments, Inc. (world's largest manufacturer of portable radiation instruments) tells of the construction and uses of its many makes and models of Geiger Counters, Scintillators, and metal detectors. If you are in the market for any one of these instruments, you will want this catalog to determine which model is best suited for your needs. Full specifications for each model and prices are also given. Circle No. 8.

CARBOLOY MINING TOOLS: The addition of 12 new cemented carbide-tipped mining tools to its line now enables Carboloy Dept. of General Electric Co. to offer users a complete off-the-shelf selection of standard tools for both continuous and universal mining equipment. The new tools include roof bolting and auger drill bits, heavy duty roof bolting drills, modified V-prong drills and a ripper head bit. Circle No. 46.

REDUCE CORROSION: Dri-Pak, a means of reducing moisture content and the corrosive effect of dampness in electrical compartments in and around the mines, has been introduced by National Mine Service Co. Particularly effective for use in electrical control panels, the unit also can be conveniently fitted in idle electric motors and in other enclosed and confined places. Circle No. 45.

Circle numbers and mail this card for free product literature

→

to get further information on any item described in the Production Equipment Preview, note the key number of that item, circle the corresponding number on the PEP card at the right, and mail. If mailed from a point outside the United States, proper postage must be used.

PLEASE PRINT

This card may also be used to subscribe by filling in here

→

See other side for subscription rates

JULY 1954 — NOT GOOD IF MAILED AFTER SEPTEMBER 25

FILL IN NUMBERS OF ITEMS YOU DESIRE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

Also send further free information on the equipment advertised on pages:

..... Product ..... Manufacturer .....

..... Product ..... Manufacturer .....

Name ..... Title .....

Company .....

Address .....

Use this section to subscribe only

☐ New Subscription

☐ Renewal

☐ 1 yr. $3

☐ 2 yr. $5

Name ..... Title .....

Company .....

Address .....

.....

STRONG DUCTILE WELDS with abrasion resistance up to four times better than manganese steel is claimed possible with Wear-Arc "Super 'W'H" electrodes, manufactured by the Alloy Rods Co. of York, Penn. Typical applications of this new hard-facing electrode are: dipper teeth, bucket fronts, crusher rolls, crusher jaws, gyratory crushers, drilling rig sheaves, dredge parts, etc. For complete information circle No. 24.

PREVENTIVE MAINTENANCE: The Sperry Ultrasonic Reflectoscope manufactured by Sperry Products, Inc., Danbury, Conn., is the latest development in the field of nondestructive testing instruments. The Reflectoscope converts electrical oscillations into mechanical vibrations and vice versa. These sound waves travel through the material under test and when they encounter any discontinuity in the test piece, they are reflected back into the search unit. The Reflectoscope is especially valuable in testing all types of shafts. To learn more about this new instrument circle No. 25.

IMPROVED FUEL INJECTORS: The Detroit Diesel Engine Division of General Motors has announced several changes contributing to longer life and increased operating efficiency in GM unit fuel injectors used in its line of Series 71 Diesel engines. New engines, such as are used in mining and construction equipment, now have the improved injectors as they leave the factory and parts kits are available to incorporate the same improvements into injectors now in use. Circle No. 14.

BIN-DICATOR: A new catalog has been compiled by the Bin-Dicator Co. of Detroit, Mich., manufacturers of the BIN-DICATOR, an automatic bin level indicator for all bulk materials. The new catalog supplies complete installation data for various types of units and explains the uses of several new improved models. For your copy circle No. 15.

ERIEX MAGNALARM: It rings a bell . . . it lights a light . . . it stops a machine! Only MAGNALARM, a completely new magnetic separator by Eriez Mfg. Co. provides this protective action. Magnalarm constantly measures the quantity of tramp iron as it accumulates on the magnet's surface, which reacts on a circuit to trip the alarm as soon as a predetermined accumulation is reached. You'll enjoy reading the full story of Magnalarm in a six-page bulletin which is yours for the asking. Circle No. 18.

POWER TRANSMISSION: Lovejoy Flexible Coupling Co. has available a new 24-page catalog covering their line of power transmission equipment. The catalog consists of six sections: variable speed pulleys, wide V-Belts, sheaves, motor bases, countershafts, and Select-O-Speed transmission. This one is a must for master mechanics. Circle No. 6.

NEW BOOK ON SILENT CHAIN: A new 88-page Silent Chain Book, containing detailed engineering data, has been published by Link-Belt Co. This is one of the most comprehensive books developed on this subject. The versatility of silent chain makes it suitable for a broad range of applications—from fractional horsepower drives to thousands of horsepower. Silent chain combines the flexibility and quietness of a belt with the positive action of gears. It is constructed of leaf links having inverted teeth designed so that they engage cut wheels. You will want to know more about silent chain drives, so circle No. 10.

HYDRAULIC HOISTS: St. Paul Hydraulic Hoist, Mattoon, Ill., has announced two new model power take-offs for GMC heavy-duty trucks with Hydra-Matic transmissions. The power take-offs are for use with any St. Paul products—hoists and bodies. For more information circle No. 3.

GEARED MOTOR CATALOG: Belgian Electric Sales Corp., exclusive sales and service organization for ACEC electric motors and SADI speed reducing equipment in the United States and Canada, has published a new Geared Motor Catalog. The new catalog, covering the ACEC-SADI line of geared motors built to NEMA specifications, is a fourteen-page technical brochure including a complete price list, dimensions, operating characteristics, photographs, and diagrams. For yours circle No. 4.

MAGNETIC GRATE SEPARATOR: Magnetic grates manufactured by the Homer Mfg. Co., Inc. of Lima, Ohio is said to trap the smallest and most elusive tramp iron particles, preventing their entrance into expensive machinery thereby eliminating costly breakage repair bills.

The HOMER MAGNETIC GRATE consists of a wire grid with horizontal rods placed between highly saturated Alnico No. 6 magnetized bars. The horizontal rods deflect free flowing material into streams which wipe the magnetized bars. For full information circle No. 21.

URANIUM PROSPECTING: A booklet telling how uranium prospecting is done with a Mineralight has been compiled by Ultra Violet Products Inc. The booklet tells of the different classes of uranium ores and minerals in addition to telling how to prospect for them. For your valuable copy circle No. 1.

"NEW CAT D8 TRACTOR," is the title of a booklet showing the new Cat D8 Tractor at work in a variety of applications. The D8 has been increased in drawbar horsepower to 150. Also illustrated is the recently developed oil clutch which makes the D8 an even better buy. Circle No. 2.

A NEW METAL ALLOY suitable for dry bearings, precision casting and fluxless welding has been developed by Chemalloy Associates of Santee, Calif. CHEMALLOY is an alloy of metals and chemicals produced by bringing together an alloy of molten metal with a treatment by a wet chemical mass. It defies rust, resists corrosion, works without lubricants in moving machines or parts, remains cool while being lathe-turned and can be made at a reasonable cost from either scrap or virgin materials. To learn how this new metal can help you, circle No. 11.

THERMALITE IGNITER CORD: Canadian Safety Fuse Co., Ltd., Brownsburg, Que. has available a brochure on the use of their THERMALITE igniter cord for rotation blasting. The brochure explains the use of THERMALITE for lighting safety fuse in stope and drift rounds including sketches of connections. Circle No. 12.

INDUCTION MOTORS: Allis-Chalmers Mfg. Co. has announced a new line of alternating current squirrel cage induction motors. The new motors (designated Type G) will retain all the important features of the Allis-Chalmers "AI" line, plus many new improvements. For complete information circle No. 13.

COMPACT G-D CATALOG: Gardner-Denver Co. has just introduced a compact catalog covering their complete line of pumps, compressors, rock drills, and pneumatic equipment. The new catalog was designed to show Gardner-Denver customers, in a handy, easy-to-use form, all the products made by the company. For yours circle No. 30.

For Free Product Literature see other side

SUBSCRIPTION RATES:
(Including the annual Review and Directory)

NORTH, CENTRAL AND SOUTH AMERICA:	one year $3 two years $6
OTHER COUNTRIES:	one year $4 two years $7

SUBSCRIPTIONS IN STERLING	P. J. Sergeant MINING WORLD c/o Barclays Bank,
one year 22/6 two years £2/	73/75 Cheapside, London E.C. 2, England
CANADIAN CURRENCY:	MINING WORLD Royal Bank Bldg., Vancouver,
one year $3 two years $5	British Columbia, Canada

FOREIGN READERS NOTE:
The copy of World Mining you are receiving consists of carefully selected material from the complete American edition of Mining World to which the above subscription rates apply. If you would like to receive the complete Mining World, fill in the lower section of the reverse side of the card at the left. The card must carry proper postage if mailed from a point outside of the United States. You may send payment or be billed later.

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD
FIRST CLASS PERMIT No. 2430, Sec. 34.9, P. L. & R. San Francisco, Calif.

MINING WORLD—WORLD MINING
121 SECOND STREET
SAN FRANCISCO 5,
CALIFORNIA
U. S. A.

Light Weight Low Cost Engine Generator Plant

To fill the need for a light, low cost, carryable engine generator plant of the widest possible application, the Lynn Engineering & Supply Co. of San Francisco, Calif., has developed the Model C-1000 "Powerhouse." This is the newest addition to the firm's complete line of portable electric plants. It is powerful enough to operate the hand-held power tools of industry and is inexpensive and light enough to provide an electrified camp site for anyone in the field. The Powerhouse is a compact power package with a maximum output of 1250 watts and a continuous sea level rating of 1,000 watts, 115 volts, single phase, 60 cycles. Power is supplied by a special Briggs & Stratton 4 cycle, air cooled engine. Overall dimensions are only 18- by 15⅝- by 15-inches and weight is held to approximately 85 pounds. A handy two-wheel cart is available if desired. Circle No. 68.

Athey Products Corp. Announces a New Trailer

Athey Products Corporation has announced the introduction of the new Athey PR21 rear-dump trailer. The Athey PR21 trailer teams with the Caterpillar DW21 tractor to haul 31 tons or 22.5 heaped yards, based on a 1 to 2 slope, at speeds up to 20 miles per hour. A wide-mouthed hopper makes shovel loading fast and easy. All-welded, frameless construction reduces and absorbs the twist and torque of high-speed hauling, powerful hydraulic hoists tilt the trailer 60° to empty any load quickly and cleanly, and individual unit brake controls give operators accurate control of rear-dumping over steep banks. Also, high-strength steels give longer equipment life and trouble-free operation. These are just a few of the many outstanding features of the PR 21 trailer; it also has the advantage that it is interchangeable with the Cat. No. 21 scraper and uses an identical hitch. To learn more about this new all-purpose hauler and how Athey can help you solve your haulage problems circle No. 67.

Joy Extensible Conveyor Offers Continuous Haulage

Joy Manufacturing Co. announces a practical, long-distance, continuous haulage system to provide uninterrupted transportation for continuous miners. The system embraces the first production model of the Joy Extensible Belt Conveyor. The Extensible Belt Conveyor consists of two main units: a crawler-mounted driving section provided with a tandem drive and a multiple-loop take-up, automatically tensioned, with storage capacity of 100 feet of belt; and a tail section, also crawler-mounted, that moves with the miner and extends the conveyor. Lightweight, portable idler stands are added to the moving belt as required. The ExB extends or retracts for 50 feet while operating under full load. New sections of belt 100 feet in length can be added in five minutes permitting another 50 feet of advance. Belt tension, alignment and slippage control are automatic. For more information circle No. 61.

HT4 Caterpillar Shovel Has Two-Position Bucket

An improved standard bucket for the HT4 shovel has been developed by Caterpillar Tractor Co. The two-position bucket will provide greater flexibility because of an adjustable pitch and a deeper bowl. This will make the unit ideal for either excavating or stockpile applications.

The two positions are achieved by changing the removable pins on each side of the bucket to either the forward or rear hinge points. The forward hinge point for stockpiling gives quicker tilt-back and less spillage because of a 10 degree rack-back at the ground line. A simple adjustment connecting the bucket to the rear hinge point retains the former digging and dumping angles desirable for excavating work. For more information on the two-position bucket, circle No. 64.

Notes From The Manufacturers

Edgar F. Schaefer, 58, president of Gardner-Denver Company, and widely-known industrial leader, died suddenly at his home in Quincy, Illinois, May 2. Mr. Schaefer first joined Gardner-Denver in 1919 as a cost clerk and through rapid promotions served in various management and executive positions, until he was elected president in 1947.

Edward F. Porter, engineer and administrator for The Dorr Company, heads the company's new sales office in Virginia, Minnesota. The new office has been set up to serve the iron mining industry of Minnesota and Michigan. Assisting Mr. Porter will be *Leon D. Keller*, who comes from the firm's St. Paul, Minnesota office.

W. J. Roberts, Sr., president of the Traylor Engineering and Manufacturing Company, Allentown, Pennsylvania, since 1918, was elected chairman of the board at the annual meeting of stockholders and directors. Succeeding him as president is **Jesse K. Mair**, formerly secretary-treasurer of the firm.

William T. Mahood has been appointed manager of Atlas Powder Company's contractors section. Well-known in mining circles, Mr. Mahood has been associated with Atlas in various sales capacities since 1936. His headquarters will be at the firm's general office in Wilmington, Delaware.

Howard E. Butters, formerly district manager for Joy Manufacturing Company in St. Louis, Missouri, has been appointed district manager at the firm's new Cleveland, Ohio office which will handle sales and service for industrial, construction, quarry, and metal and non-metallic operations in the Ohio-Michigan area.

Western Machinery Company has appointed a new sales engineer for the WEMCO division at Columbus, Ohio. He is **David L. Springston**, chemical engineer with several years experience in sales and field engineering work. Mr. Springston will be in charge of territory covering Ohio, West Virginia, western Virginia, and eastern Kentucky.

A new Worthington Corporation subsidiary, Worthington Limitada, in **Bogota, Colombia**, will be managed by **Charles Gorham**, who has been with the pump manufacturing firm since 1939 and has been stationed in Colombia for five years.

Kleenslot

THE IDEAL SCREEN FOR DEWATERING AND SIZING

THEY CAN BE DESIGNED AND ADAPTED TO FIT ANY MAKE OF VIBRATOR

Perfect separation on wet or dry screening. Rigid construction and method of installation prevents "skipping".

Cross section at left shows how KLEENSLOT Screens operate on a non-clogging principle.

WEDGE WIRE CORP.
Gas St. at Nickel Plate R.R., Wellington, Ohio

Gentlemen:
Please send us literature outlining the superiority of Wedge Wire construction.

COMPANY _____

NAME _____

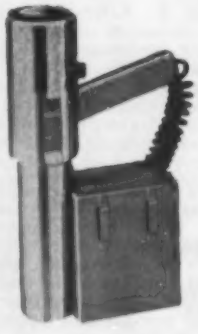
ADDRESS _____

SEND FOR OUR ILLUSTRATED LITERATURE

Wedge-Wire CORPORATION
GAS ST.
AT NICKEL PLATE R.R.
WELLINGTON, OHIO

SCINTILLATION COUNTERS

FIND URANIUM 100 TIMES EASIER



MODEL 111 (pictured above) . . . $495.00
FAMOUS HALROSS MODEL 939 . . 975.00
AIRBORNE OPTIMUM MODEL SAB-7 . 2810.00

• • • • •

ALL TYPES GIEGER COUNTERS
ULTRA VIOLET LIGHTS
SPECIAL LONG PROBE SCINTILLATION AND GIEGER COUNTERS FOR DRILL HOLES

• • • • •

ENGINEERS SYNDICATE, LTD.
5011 Hollywood Boulevard
Hollywood 27, California
OLympia 2167

U.S.A. Metal & Mineral Prices

METALS

June 21, 1954

COPPER:	**Electrolytic.** Delivered F.o.b. cars, Valley basis	30.00¢
	Lake. Delivered, destinations, U.S.A.	30.00¢
	Foreign Copper. Valley basis	29.75-30.00¢
LEAD:	**Common Grade.** New York	14.00¢
ZINC:	**Tri-State Concentrates,** jig, flotation 80% lead, per ton, Eagle-Picher	$169.85
	Prime Western; F.o.b. E. St. Louis	11.00¢
	Prime Western; Delivered, New York	11.50¢
	Tri-State Concentrate, 60% zinc, per ton	$64.00
ALUMINUM:	**Primary 30 Pound Ingots (99% plus).** F.o.b. shipping points	21.50¢
ANTIMONY:	**Lone Star Brand.** F.o.b. Laredo, in bulk	29.00¢
BISMUTH:	(in ton lots) price per pound	$2.25
CADMIUM:	**Sticks and bars.** 1 to 5 ton lots (Price per pound)	$1.70
COBALT:	**97-99%,** keg of 550 pounds (Price per pound)	$2.60
COLUMBIUM:	**Powder** Nom., per pound	$75.00
MAGNESIUM:	**Ingots (99.8%).** F.o.b. Freeport, Texas	27.00¢
MERCURY:	**Flasks,** Small lots, New York	$270.00-$275.00
NICKEL:	**"F" Ingots (5 pounds).** F.o.b. refinery,, Port Colbourne, Ontario	60.00¢
TIN:	**Grade A Brands.** New York (Price per pound) Prompt delivery	95.75¢
TITANIUM:	**99.3%** + (Price per pound)	$4.72
GOLD:	United States Treasury price	$35.00 per ounce
SILVER:	**Newly mined domestic.** United States Treasury price	90½¢ per ounce
	Foreign Handy & Harman	85.25¢ per ounce
PLATINUM:	**Per Ounce**	$84.00-$87.00
ZIRCONIUM:	**Powder,** 100 pound lots, per pound	$7.00

ORES AND CONCENTRATES

BERYLLIUM ORE:	**10 to 12% BeO.** F.o.b. mine, Colorado	$47.00 per unit
	Small lot purchases at Custer, S. D., Spruce Pine, N. C., and Franklin, N. H. Visual inspection at $400.00 per short ton or by assaying at: 8.0 to 8.9% BeO, $40 per unit; 9.0 to 9.9%, $45; over 10.0%, $50.	
CHROME ORE:	F.o.b. railroad cars eastern seaports. Long tons dry weight.	
	African (Rhodesian). 48% Cr_2O_3. 3 to 1 Ratio	$44.00-$46.00
	African (Transvaal). 48% Cr_2O_3. No Ratio	$31.00-$32.00
	Turkish. 48% Cr_2O_3. 3 to 1 chrome-iron ratio	$49.00-$50.00
	U. S. Government ore purchase depot Grants Pass, Oregon, Base price, lumpy ore, $115.00; fines and concentrates $110.00 for 48% Cr_2O_3 and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr_2O_3.	
COLUMBIUM-TANTALUM ORE:	At United States small lot beryl purchase depots. $3.40 per pound contained combined pentoxides in 50% ore. Includes 100% bonus.	
IRON ORE:	Lake Superior. Per gross ton Lower Lake Ports	
	Mesabi, Non Bessemer, 51.5% Fe. Second quarter	$9.90
	Mesabi, Bessemer, 51.5% Fe. Second quarter	$10.05
	Old Range Non Bessemer. Second quarter	$10.15
	Old Range Bessemer. Second quarter	$10.30
	Swedish, Atlantic Ports, 60 to 68% Fe, Contracts, Per Unit	22.00¢
MANGANESE ORE:	**Metallurgical grade.** 48 to 50% Mn. Long ton unit	$1.05-$1.07
	Metallurgical grade. 46 to 48% Mn. Long ton unit	$0.95-$1.05
	Metallurgical grade. 45 to 48% Mn. Long ton unit	$0.85-$0.95
	Chemical grade. 80% MnO_2. Per ton	$70.00
	Domestic U. S. Government are purchasing depots: Deming, New Mexico; base price $2.30 per long dry ton unit of recoverable manganese less handling and treating costs. Wenden, Arizona; base price of $8.54 per long dry ton of 15% manganese ore. Butte, Montana; (black and pink ores) base price of $4.87 per long dry ton of 18% manganese ore. Phillipsburg, Montana base price of $6.43 per long ton unit of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) $2.30 per unit with premiums and penalties.	
MOLYBDENUM CONCENTRATE:	90% MoS_2 F.o.b Climax, Colorado. Per pound of contained molybdenum, plus cost of containers	$1.00
TUNGSTEN CONCENTRATE:	**Domestic.** 60% WO_3 Per short ton unit	$63.00-$65.00
	Foreign. 65% WO_3 Per short ton unit (Scheelite)	$25.00
	Foreign. South American, Spanish, Portuguese	$24.00
URANIUM ORE:	**Carnotite-Roscoelite.** F.o.b. purchase depot plus $0.06 per ton mile ($6.00 maximum), Grand Junction, Rifle, Durango, Naturita and Uravan, Colorado. Salt Lake City, Marysvale, Thompsons, Moab, and Monticello, Utah. Shiprock, and Bluewater, New Mexico, Edgemont, S. Dakota. Base price for 0.10% ore is $1.50 per pound and up to $3.50 per pound of contained U_3O_8 plus $0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of $0.25 per pound for each in excess of 10 pounds. A $0.50 per pound development allowance paid on all ores purchases. At Shiprock all ores with more than 6% lime are penalized for excess lime.	
VANADIUM ORE:	**Carnotite-Roscoelite.** V_2O_5 in ratio of more than 10 parts to 1 part of U_3O_8 are generally acceptable at all AEC depots, but excess not paid for at Marysvale, Monticello, Shiprock, and Bluewater Per Pound V_2O_5	$0.31

NON-METALLIC MINERALS

BENTONITE:	**Minus-200-mesh.** F.o.b. Wyoming points. Per ton in carload lots	$12.50
	Oil Well grade. Packed in 100 pound paper bags	$14.00
FLUORSPAR:	**Metallurgical grade.** 70% effective CaF_2 content per short ton F.o.b. Illinois- Kentucky mines	$42.50
	Mexican. 70% f.o.b. border	$25.00
	European, Atlantic Ports, 70%	$37.00
	Acid Grade. 97% CaF_2 F.o.b. Kentucky, Illinois, Colorado	$60.00
PERLITE:	**Crude:** F.o.b. mine per short ton	$3.00 to $5.00
	Plaster grades. Crushed and sized. F.o.b. plants	$7.00 to $9.00
SULPHUR:	Long ton, F.o.b. Hoskins Mound, Texas	$25.50
	Export	$30.50

LONDON METAL AND MINERAL PRICES

June 21, 1954

		Per Long Ton	USA Equivalent cents per pound[1]
COPPER:	**Electrolytic, spot**	£239 10s 0d	29.94¢
LEAD:	**Refined, 99.97%**	£96 15s 0d	12.09¢
ZINC:	**Virgin, 98%**	£80 0s 0d	10.00¢
ALUMINUM:	**Ingot, 99.5%**	£156 0s 0d	19.50¢
ANTIMONY:	**Regulus, 99.6%**	£210 0s 0d	26.25¢
TIN:	**Standard, 99.75%**	£726 0s 0d	90.75¢
TUNGSTEN:	**Long ton unit, 1605 equivalent to**		$22.40

1. With Sterling pound at $2.80.

Quotations on metals and certain ores through the courtesy of *American Metal Market*, New York, N.Y.

Hanna's Nickel Plant Readies for Production

Production at the first commercial nickel ore producing plant in the United States—Hanna Nickel Smelting Company's Riddle, Oregon operation—is getting under way and full facilities are scheduled for completion by the end of the year.

Using nickel silicate ore from nearby Nickel Mountain, the $25,000,000 project is expected to process 54 tons of ferronickel per day. Hanna Nickel Smelting, in charge of the operation, is a subsidiary of M. A. Hanna Company, Cleveland, Ohio. Another subsidiary, Hanna Coal and Ore Company, is handling the mining operation. A contract has been signed with the federal government to sell the ore at $6.00 per ton for resale at the same price to the smelting firm.

Electric power will be available under a 20-year contract with the Bonneville Power Administration to supply 65,000 kilowatts to the plant. An agreement with the California-Oregon Power Company calls for delivery of the federally produced power to the plant over its new 115,000-volt line. Since the contract exhausts a block of 120,000 kilowatts set aside for critical defense industry, Bonneville may cut back deliveries to Hanna after July 1, 1965.

Million Dollar Program Set for Silver Mt. Claim

A $1,000,000 exploration and development program will be undertaken by Bunker Hill & Sullivan Mining and Concentrating Company and Hecla Mining Company on property owned by Silver Mountain Lead Mines, Inc., east of Mullan, Idaho.

Terms of the agreement include completion of $25,000 worth of diamond drilling this summer, and completion of underground work equivalent to 2,400 feet of crosscutting or drifting in each 12-month period beginning April 1, 1955. Hecla and Bunker Hill have agreed to pay the entire cost of the exploration and development work up to $1,000,000, without any reimbursement. When that amount has been spent, or when an ore body has been located, whichever occurs first, the two firms will each be granted a 37½ percent interest in the property, with Silver Mountain retaining the remaining 25 percent.

Sullivan Mining Company, owned jointly by Hecla and Bunker Hill, has had a development contract on the property since 1952. Last year the firm requested and received an extension of time until July 1, 1955 because of low base metal prices. This agreement was cancelled with the negotiation of the new contract.

The companies started work immediately. Road and drill sites are being completed, prior to drilling of three 1,000-foot, holes which will determine geological structures and serve as a guide in subsequent development. The underground program includes sinking of a 2,000-foot shaft (tentatively to be located near the Idaho Silver Tunnel), and about 8,000 feet of lateral work on this horizon.

The Defense Minerals Exploration Administration has increased by $69,000 the authorized expenditures under a lead-zinc exploration project at the Bonner County, Idaho property of *Whitedelf Mining and Development Company*. Total cost has been increased to $232,950. New work approved by the government agency includes 1,500 feet of additional drifting on the 800 level where several lead-silver ore shoots have been opened.

Nearly 400 feet of ore had been opened, at last report, in a vein on the 3,200-foot level in the New Purim area of the Coeur d'Alene mining region's silver belt, Shoshone County, Idaho. Development work has shown two veins roughly parallel and about 20 feet apart. A development tunnel is to be run to the area soon from the 3,400 level of the adjoining *Silver Summit* mine by the operating *Polaris Mining Company*. *Polaris Silver Dollar, Hayden Hill Consolidated,* and *Lincoln* mining companies have ownership interests in the area.

Sidney Mining Company, Pine Creek zinc-lead district, Shoshone County, Idaho, is deepening its main shaft to open a new 1,700-feet level this summer. Income from leasing operations in upper portions of the mine is expected to pay for the work. Disappointing results were obtained on the 1,300 and 1,500 levels but geological conditions are expected to improve on the new bottom level. Malcolm C. Brown, of Kellogg is president.

Test drilling of black sand placer deposits in the Wood River Valley near Hailey, Idaho for monazite and uranium minerals is underway by the U.S. Bureau of Mines. Churn drilling and trenching methods are the same as employed by the Bureau for several years in testing black sands for monazite in Bear Valley and other southern Idaho areas.

Phosphatic shale shipments have started from the *J. R. Simplot Company's Gay* mine near Fort Hall, Idaho. About 650,000 tons of the shale will be shipped to *Westvaco Chemical Company's* Elemental Phosphorous Plant this year, and over 100,000 tons of high-grade rock will go to Simplot's fertilizer plant at Pocatello, Idaho.

Capacity of the Galena concentrator at the *Vulcan* mine west of Wallace is being increased to 350 tons daily from 150 tons. Another ball mill and additional flotation cells will be installed this summer. *American Smelting and Refining Company* acquired the concentrator recently from *Zanetti Brothers* of Wallace, who had treated Vulcan development ore for the last three years. ASARCO is planning to put the mine on a regular producing basis early in 1955. J. E. Berg is general manager of the firm's Northwest mining division.

More than 1,000 feet of a new three-compartment shaft raise has been driven at the *Lucky Friday* mine east of Wallace, Idaho, leaving less than 1,400 feet to go. Production is averaging about 125 tons daily from stopes above the 2,300 level. An exploration tunnel on the 2,000 level is being driven to explore adjoining ground of *Hunter Creek Mining Company*.

Polaris Mining Company found silver-copper ore at the 2,650-foot point in a two-mile, below-sea-level exploration tunnel it is running easterly from its *Silver Summit* mine north of Osburn, Shoshone County, Idaho. The discovery was made in *American Silver Mining Company's* "Wire Silver" vein several hundred feet west of the most westerly mineralization opened in the vein at a higher level. Work is being done under a multi-company operating and profit-sharing agreement with aid of a DMEA loan of nearly $350,000. L. J. Randall of Wallace is president of Polaris.

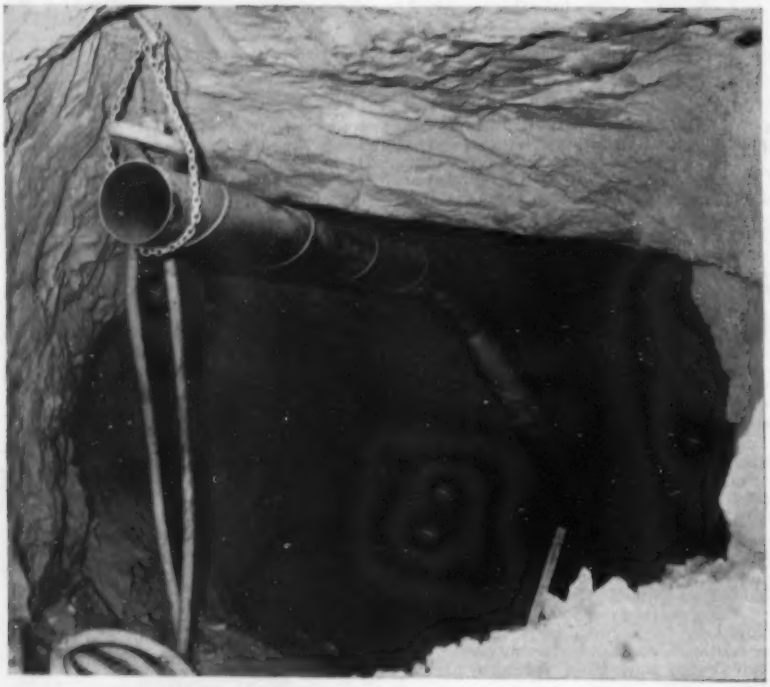
Gem Monazite Mines, Inc. of Boise, Idaho is reported to have interested a group of men headed by Joseph Fleitell of Washington, D.C. in completion of financing for a dredge and separation plant for the firm, and in development of its leases in the Cascade area.

The *San Francisco Chemical Company* will ship phosphate rock from its *Waterloo* mine in Montpelier Canyon, Idaho to Korea. Exploratory operations at the firm's *Cumberland* mine in the same vicinity have been temporarily suspended. Portable equipment is being moved to the *Crawford* underground mines.

Basin Jib Uses Shovel Bucket for Drill Staging

The Basin Jib Gold Mines, Inc. is open-pit mining large blocks of gold-silver-lead ore at its mine near Basin, Montana. These blocks were missed when the mine formerly was operated as an underground mine. Pictured here is a drill crew at work in an open pit. Because of the broken and ravelly nature of the ore near the surface, it has proven very difficult to drill down holes for blasting. Accordingly, M. R. Massey, superintendent, devised the system where the drill crew, a Copco Airleg machine, and steel are elevated against the pit face in the bucket of the one-yard Northwest Diesel shovel. By this system 11-foot holes have been safely and easily drilled in the high overhanging bank. The company is shipping the ore to the East Helena lead smelter of the American Smelting and Refining Company. Basin Jib has headquarters in Toronto, Canada. D. Denny is president.

PIPE WITH A "ONE-TWO" PUNCH



Naylor light-weight pipe is your best bet to "knock out" gas, fumes, and stale air in underground operations. In push-pull ventilation, it gives you a "one-two" punch that can't be matched in the light-weight class because no other light-weight pipe has Naylor's exclusive lockseamed-spiralwelded structure. The extra collapse strength provided by this structure makes it possible to build Naylor vent pipe of lighter gauge material without any sacrifice of performance. Other savings are assured through use of the Naylor one-piece Wedge-Lock coupling — the quickest possible connection available today. Write for Bulletins No. 507 and No. 514 to get the full story on this unbeatable Naylor combination.

NAYLOR PIPE

Naylor Pipe Company • 1242 East 92nd Street, Chicago 19, Illinois

Eastern U.S. and Foreign Sales Office: 350 Madison Avenue, New York 17, New York

NORTHWEST

Geophysical Minerals Exploration Company has filed articles of incorporation in Boise, Idaho to conduct mining and dredging operations. With capital stock listed at $50,000, the directors are Elton Neal Pigg, James Henry and Oscar W. Worthwine, all of Boise. Incorporated at Salmon, Idaho recently was the *Rosebud Mines*. Listed capital stock is $50,000, and incorporators were James H. and Herbert D. Coles of Salmon and Charles T. Plum of Leadore.

Idaho Custer Mines, Inc. has resumed underground work at its *Livingston* mine, Custer County, Idaho. The Defense Minerals Exploration Administration has approved an exploration project estimated to cost about $93,000. C. Paul Grosenick of Seattle is president.

Silver Star Mines, Inc., successor to *North Star Mining and Development Company*, is consolidating groups of claims north of Wallace. Its holdings now include the *North Star*, *Marshall* and *Duluth* groups, and negotiations for the *Silver Eagle* and *Ruth* groups are well along. An assessment of ½-cent a share on class B stock has been made to meet expenses and do annual work requirements.

Twin Rivers, Inc., a placer mining firm of Riggins, Idaho, will dredge the old *Golden Rule* placer mine on Grouse Creek in the Warren mining district this season. The new plant is capable of handling up to 250 yards of gravel per hour according to president Rex F. Winters, and plans are for an initial rate of 100 yards per hour. Both gold and radioactive sands will be recovered. The Golden Rule is owned by the Winkler brothers and Mrs. Minnie Freehafer McClure of Payette.

Sinking of an 800-foot shaft at the *Vindicator Silver-Lead Company* property near the *Lucky Friday* mine is proceeding on an around-the-clock basis. Progress is at a rate of about 100 feet monthly. Work is being done by *Silver Buckle Mining Company* of Wallace and *New Park Mining Company* of Salt Lake City and its associated *East Utah and Oil, Inc.*, firms under a $114,750 DMEA contract. Dr. E. F. Scott, Wallace, is president.

Early mill construction is planned by *Silver Star-Queens Mines, Inc.* at its *Minnie Moore* and *Queen of the Hills* mines near Bellevue, Blaine County, Idaho. N. T. Davis of Hailey is president and general manager.

About 200 tons of sulphuric acid are being made daily in *Sullivan Mining Company's* new $3,000,000 acid plant adjoining its electrolytic zinc plant near Kellogg, Shoshone County, Idaho. Capacity is 250 tons a day. The acid is made from sulphur dioxide fumes given off in roasting of zinc concentrates. The zinc plant is operating at only three-fourths of capacity because of unfavorable zinc marketing conditions. Output is about 3,700 tons of slab zinc monthly. W. G. Woolf is superintendent.

New camp facilities and a substantial mill are planned at the *Star Mines* property near Dixie, Idaho County, Idaho by Roy E. Smith and associates. The former *Mammoth Mines* property was relocated for the new owners by A. C. Carpenter, original owner, after standing idle many years. Extensive prospecting last year disclosed a new vein.

Idaho Goldfields, Inc. has signed a development and production contract with A. C. Milholland, Smelterville, Idaho, contractor, and associates. Milholland will

work a lead-silver vein opened by the company in a shallow winze on the old *Donahoe* claims east of Coeur d'Alene, Kootenai County. L. A. Thompson of Spokane is company president.

John H. and Herbert D. Coles of Salmon and Charles T. Plum of Leadore, Idaho have incorporated *Rosebud Mines* with listed capital stock of $50,000. *Primitive Exploration and Finding Company* has been organized by Hailey, Idaho men to explore for uranium in south-central Idaho. Arthur Hall is president, Bill Brooks is secretary-treasurer.

Twenty-four lessees now are working under an incentive block leasing system introduced last year by *Spokane-Idaho Mining Company* at its *Constitution* mine in the Pine Creek zinc-lead district of the Coeur d'Alene mining region, Shoshone County, Idaho. Under the incentive of 50 percent of the net smelter returns, the lessees are breaking twice as much rock as when they worked for the company and their output is averaging nearly 14 percent lead-zinc content, about double the former grade. Brower Dellinger is manager. (See MINING WORLD, March 1954, pp. 54-56, for details of the system.)

MONTANA

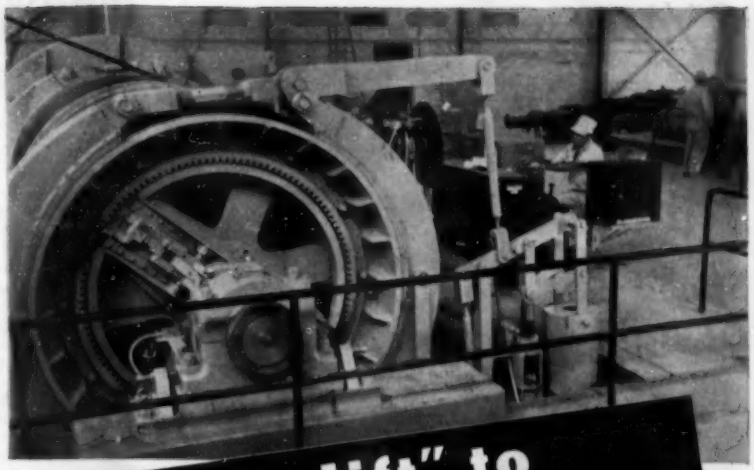
The equipment at the *Ermont* mine in the Argenta district south of Dillon, Montana is being disposed of by the Roger Pierce Equipment Company of Salt Lake City, Utah. The Ermont was a precious metal producer for many years but has been closed since the start of World War II.

T. J. Linton and associates, former operators of the *Linton* lead mine 25 miles east of Missoula, Montana, are moving equipment into the head of the German Gulch, approximately 10 miles south of Anaconda. They are reported to have taken a lease and bond on a large group of placer and lode gold claims.

The present operator of the *Blackfoot* gold mine, Mr. Henderson of Garrison, Montana, plans to crosscut to the granite-lime contact zone on the lower level of the mine. The purpose of this exploration is to prospect at depth a promising copper mineralization noted on the surface. The mine is in the Ogden Mountain mining district, six miles east of Helmville, Montana.

Articles of incorporation have been filed for two new firms in Montana *Butte Western Mining Company* lists authorized capital stock of $1,000,000 in Yellowstone County. Offices will be in Billings, with seven directors: D. O. Mecklenburg, Melvin H. Von Hess, Glenn H. Scheihing, Al C. Fisher, W. R. Mefford, and Harold B. Holden, all of Billings. *Granite Mining Company* of Big Timber has filed its incorporation data at Helene, with directors James H. Borden, J. Ray Bridges, Sr., and Lyman H. Bennett, Jr., all of Bozeman. Capitalization is for $100,000.

Roy Walton of Bozeman, Montana, has sold the *Gallatin* and *Hyalite Canyon* vermiculite and calcite claims near Bozeman to *Western Mining Corporation* of Boise, Idaho, which has announced plans to build a plant at Nampa, Idaho, for manufacture of building products from the minerals.



Typical of hoists designed and manufactured by Stearns-Roger *for specific requirements* is this twin drum, 22,000 lb. electric hoist installed in a large Western mine.

Each drum is cast Meehanite®...84" diameter with 78" face, winding 1,200 feet of 1⅜" cable. One drum is fixed and the other clutched. Brakes are set by gravity and released hydraulically. Drums are fitted on 10" shafts with three self-aligning bearings, with two such bearings serving the 6" pinion shaft.

Rating is 22,000 lbs. rope pull at 1,000 ft. per minute rope speed.

Stearns-Roger

THE STEARNS-ROGER MFG. CO. DENVER COLORADO

® Registered Trademark

SYNTRON

ELECTRIC VIBRATORS

Speed The Flow Of Bulk Materials

through bins, hoppers and chutes

On bulk handling jobs where economy and speed are important, Syntron "pulsating magnet" Vibrators assure a positive flow of fine powders or hard-to-handle lumps. Their 3600 controllable vibrations per minute keep bins, hoppers and chutes flowing freely with no arching or plugging.

WRITE FOR COMPLETE CATALOG DATA—FREE

SYNTRON COMPANY
166 Lexington Avenue Homer City, Penna.

Why Search for URANIUM with a Horse and Buggy?

THE New ROYAL SCINTILLATOR

★ Is more sensitive than any other Scintillator or Geiger Counter
★ Easily detects *deeply* buried Uranium deposits from ground or air
★ Produces results never before possible
★ Can be used for oil field surveys
★ Made by the manufacturers of the famous "Scintillator"

Dealers Wanted

Send for free complete catalog of Geiger Counters, Scintillators and metal locators including the new "Special Scintillator" priced at only $299.50

PRECISION RADIATION INSTRUMENTS, INC.
2235 MWR So. La Brea Ave., Los Angeles 16, California
Please send Free Catalog.
NAME_____ TITLE_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE___ STATE_____

WORLD'S LARGEST MANUFACTURERS OF PORTABLE RADIATION INSTRUMENTS

NORTHWEST

Dr. J. R. Van Pelt, president of Montana School of Mines, has announced that *The American Smelting and Refining Company* has awarded two scholarships to the school for the year 1954-1955—one to a student in mining and the other to a student in metallurgy. As in the past, the stipends will amount to $500 for each recipient who will be selected between now and the close of the present school year. These awards have been announced each year at commencement time and are recognized as among the most significant honors open to students at the Montana School of Mines.

WASHINGTON

Pend Oreille Mines and Metals Company has put a third 800-ton unit in operation at its new flotation plant in northeastern Washington's Metaline mining district. The No. 1 unit is being overhauled. Only two of the three units will be operated at the same time until the price of zinc merits full-scale production. Mechanization has greatly increased output per man. About 90 percent of operations now are by trackless mining and underground quarrying methods. Direct operating costs were reduced $90,000 in the first quarter of this year from the first three months of 1953. Sinking of the main incline shaft was halted recently at the 1,220-foot point and raising started to connect with a new main station. W. L. Zeigler is general manager.

Grandview Mines, Spokane, Washington has resumed diamond drilling at its *Dosser-Maki-Lotz* holdings southeast of Deep Lake, Stevens County. A wide iron-bearing capping is being tested at depth under a $36,400 DMEA contract. Karl W. Jasper is president.

Goldfield Consolidated Mines Company has resumed milling operations on a one-shift basis at its flotation plant near Aladdin, Stevens County, Washington. The mill was shut down last fall because of low zinc-lead prices. Exploration work was continued at the *Deep Creek* mine. Fifteen men are employed in mining and milling operations. Truman (Cy) Higginbotham is manager.

Harris & Bumgarner, Northport mining contractors, have resumed mining of lead ore at the old *Electric Point* mine in northern Stevens County. Production is from offshoots of the Yoder ore chimney, mined years ago. Ore not rich enough for direct shipment to the Bunker Hill smelter at Kellogg, Idaho, is concentrated in a small mill completed last fall. The property is leased by *State Mining Company*, headed by Fred M. Viles of Spokane.

Germania Consolidated Mines, Inc. is considering the mining and milling of low-grade ferberite-scheelite ore from its property near Fruitland, southwestern Stevens County, Washington. The Bureau of Mines' Albany, Oregon, laboratory has informed the company that acceptable tungsten concentrates can be made from the ore. The firm has been processing wolframite and shipping to the *Big It* tungsten mill west of Kellogg, Idaho, for upgrading prior to sale to General Services Administration. E. I. Fisher of Spokane, is secretary-treasurer.

Two Congressional Bills Can Aid Uranium Miners

Domestic uranium miners will receive important benefits if two bills now under consideration by the United States Congress are enacted into law.

The joint bill, S 3344 and HR 8892, has for its main object the clarification of two existing systems covering ownership and mining of minerals on the federal public domain. The bill has strong backing by the Colorado Mining Association, Utah Mining Association, the Rocky Mountain Oil and Gas Association, and various federal bureaus and commissions. For uranium miners the bill would permit locations for uranium on areas leased earlier for oil and gas. Provisions are also made for removing difficulties for joint occupancy by uranium, and oil and gas interests.

Three Colorado Plateau Uranium Mills Expanding

So successful has been the search for, discovery of, and mining of uranium ores on the Colorado Plateau that unmilled stockpiles have grown appreciably in the last year. With this backlog of assured ore and with favorable mine development, three major uranium plants are being enlarged.

At Bluewater, New Mexico the Anaconda Copper Mining Company has signed a contract with the United States Atomic Energy Commission for major expansions. The existing carbonate leach plant treating Todilto limestone ores from the Grants district which was started in the fall of 1953 is to be enlarged. A new acid leach plant will also be constructed to treat sandstone type ores which are being mined by Anaconda on the Laguna Indian Resrvation east of Grants, by the Haystack Mountain Development Company (A. T. & S. F. subsidiary) northwest of Grants, and by a number of smaller producers in western New Mexico and eastern Arizona. The new units are expected to be in production in 18 months.

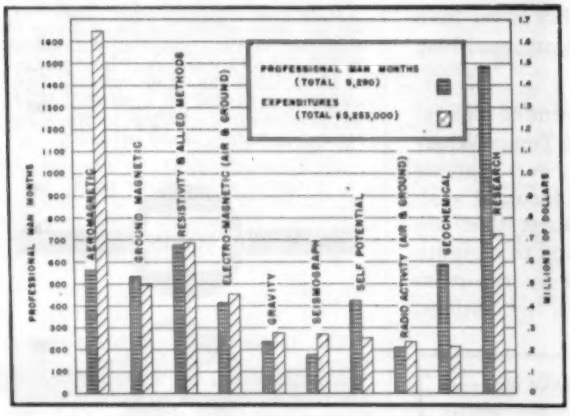
A major expansion program for the Vitro Uranium Company, Salt Lake City, Utah, has been announced by William B. Hall, general manager. A division of Vitro Corporation of America, the uranium firm plans to increase its mill capacity by 50 percent as soon as possible. The expansion program includes additions in the roasting, ore handling, and leaching departments. Details are still in the planning stage and considerable pilot plant work will be carried out before final plans are set up. The company also has announced a new agreement with the Atomic Energy Commission to produce uranium oxide at its Salt Lake plant. The contract is retroactive to January 1 of this year. Vitro treats non-Carnotite ores from the Marysvale, Utah district; asphaltic ores from Temple Mountain, Utah; and some ore from the Mi Vida mine of Utex Mining Company southeast of Moab, Utah.

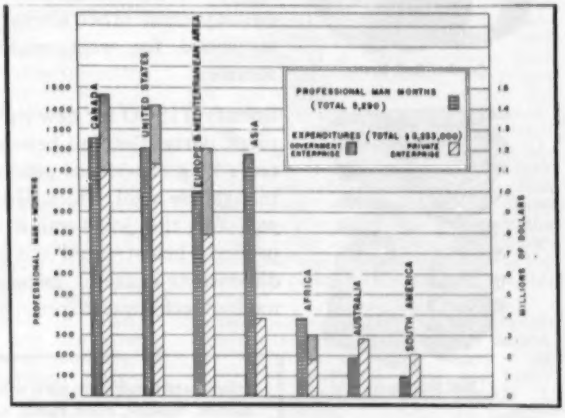
In the third expansion project the Atomic Energy Commission awarded a contract to the Galigher Company for engineering design, plans, specifications, and cost estimates for an addition to AEC's Monticello, Utah plant. The process is to be an acid leach to recover uranium from the complex ores that the Commission has purchased and stockpiled at Monticello and which are not amenable to the soda ash leaching circuit. Galigher has operated the plant for the AEC since 1948 treating, in large part, AEC directed carnotite type uranium ore.

Ores to be treated in the new plant whose construction may be started this fall are already stockpiled at Monticello and have come largely from the Mi Vida mine of the Utex Exploration Company discovered by Charles Steen and from the Happy Jack uranium-copper mine of Cooper and Bronson in White Canyon.

Bear Creek Mining Company has started its second diamond drill hole on Greenback Mountain in the Bonanza mining district, Saguache County, Colorado. According to reports, the first hole was abandonded at a depth of approximately 2,000 feet before reaching its objective. (See MINING WORLD, August 1953, Page 97). The company is drilling in an area selected because of favorable geophyscial and geological survey results. Large deposits of base metals have been found in central Colorado in the Leadville Blue Limestone. The limestone does not crop out in the area but is covered by a series of overthrust andesite and rhyolite rocks. The exploration projects are under the supervision of Dr. James Boyd, exploration manager for Bear Creek, who has headquarters in New York City.

A stimulus to Colorado's tungsten industry has been forecast by the purchase of the former *Boulder Tungsten Mines, Inc.* mill west of Boulder, Colorado, by the New York firm, *Wah Chang Corporation*. Headed by K. C. Lee, the Wah Chang group purchased the property after the federal government had foreclosed on it in March when the former owners were unable to meet contract deliveries. Wah Chang is one of the biggest tunsten producers in the nation and





Use of Geophysical Exploration Methods Shows Gain in 1953

A record high for geophysical activity in the mining industry during 1953 has been reported by Sigmund Hammer of the Society of Exploration Geophysicists. World expenditures for mining geophysics—the applications of geophysical methods in explorations for solid minerals—totaled $5,253,000, while utilization of manpower for the year was 5,290 professional man-months. The above charts show the rate of activity during the year in terms of methods and areas. Analysis of method application (left) shows that magnetic (especially aeromagnetic) methods led other processes, with resistivity and allied electrical methods rated second in use. On a geographical basis (right), Canada was first in use of geophysics, with the United States a close second. Incomplete reports prevent a thorough comparison of statistics for 1953 with those for 1952, but it appears that minor increases in applications were recorded in the electrical and gravity methods and that the use of various techniques of geochemistry increased over the previous year. The report was given by Mr. Hammer at a joint meeting of the Society of Exploration Geophysicists, Society of Economic Paleontologists and Mineralogists, and the American Association of Petroleum Geologists in St. Louis, Missouri. Headquarters of the former group are in Tulsa, Oklahoma.

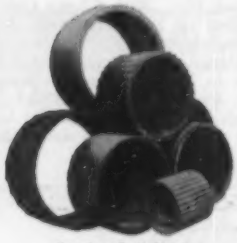
The Steel that Builds a "CALLOUS" to Resist Wear!

Outstanding for wear parts in crushers, pulverizers, mills, conveyors, shovels, etc.

TISCO®
MANGANESE STEEL
The HARDER it works ...the HARDER it gets

Dipper Tooth

- **Cold work-hardens to needs of the job**
- **Outlasts other alloys 2 to 5 times under heavy impact and abrasion**



Crusher Roll Shells

TISCO Manganese Steel actually grows stronger with increasing wear-resistance under the heavy pounding, shock and abrasion that destroy most other alloys. It has never been surpassed for wear-resistance in punishing service.

Ball Mill Liners

Specify TISCO for new equipment or replacement parts. Get full benefit of Taylor-Wharton's long experience producing and applying manganese steel, which assures the right analysis for the job—sound castings that are properly heat-treated and ground to accurate dimensions—careful inspection by the most modern techniques to provide flaw-free castings.

Rebuild and repair worn parts with TIMANG Weld Rod, Rounds, Squares, Flats, Plates, Repoint Bars, Grouser Bars, Tooth Repointers.

Write for descriptive bulletins.

Founded TW 1742

TAYLOR-WHARTON
IRON AND STEEL CO.

HIGH BRIDGE 2, N. J.
Cincinnati, O. Birmingham, Ala.
Easton, Pa.

may begin buying ore from neighboring mines for processing after it takes over operation of the property.

UTAH

Walter Gramlich of Moab, Utah is believed to have marketed the highest priced ton of uranium ore yet purchased by *Climax Uranium Company* and mined on the Colorado Plateau. A reported $4,034.52, including AEC bonus and premiums, was paid for the ore Mr. Gramlich's firm, *Gramlich Exploration Company*, delivered to Climax in May. The ore came from the *Blue Jay* mine in the Browns Hole district, southwest Utah.

The *Lavender Uranium Corporation* is one of the newest uranium firms in Utah. President of the new company is George E. Bridwell, Salt Lake City. Other officers are Stanley M. Perkins, vice president, and T. J. Vander Jagt, Robert M. Schubach, Richard Roddin, and Oscar C. Karass, directors.

Nearly $1,000,000 in production bonuses has been paid by the U. S. Atomic Energy Commission to shippers of uranium ore in Utah. This represents about one-third of the total uranium outlay by the AEC. Six Utah properties have qualified for the full 10,000-pound bonus, which ranges from $15,600 to $35,000 extra for initial production. They include the *Ferron* uranium claim, Emery County; *Raemiare* group of claims, Grand County; *Yellow John* group, San Juan County; *Delta* mineral claims, Emery Country; *Mitten No. 1*, San Juan County, and *Linda Mujer* group, San Juan County. Another 15 properties have received half or more of the full bonus.

A uranium research and geologic service has been established by a group of University of Utah scientists. With offices in Salt Lake City and field headquarters in Moab, Utah, the *Geoprofessional Services, Inc.* is headed by Armand J. Eardley, professor in the College of Mines and Mineral Industries at the university.

WYOMING

The *Lucky Mac*, original group of uranium claims in Fremont County, Wyoming, reports an option agreement has been signed with *New Park Mining Company* of Salt Lake City, Utah, for investigation of the 50 claims of the group in the Gas Hills area. New Park and its affiliates also have uranium holdings in southeastern Utah and Colorado.

Preliminary test drilling in the Gas Hills area of Fremont County, Wyoming has been completed by the *Rupert Drilling Company* of Worland, under contract with the United States Atomic Energy Commission. Testing has been confined to the southern flank of the Wind River Basin where the original Fremont County uranium discovery was made late last year.

Erie Mining Awards Two Construction Contracts

Erie Mining Company has awarded two new contracts in connection with its $300,000,000 taconite project near Aurora, Minnesota.

A contract covering construction of a breakwater, ore dock, and harbor facilities at Taconite Harbor, 77 miles northeast of Duluth, was awarded to the Dravo Corporation of Pittsburgh, Pennsylvania.

A contract covering grading, drainage, bridge and tunnel work on approximately a 70-mile railroad from the plant to Taconite Harbor was awarded to a joint venture comprised of five contractors known as Arrowhead Constructors. They are: Winston Bros. Company of Minneapolis, Minnesota; C. F. Lytle Company of Sioux City, Iowa; Green Construction Company of Des Moines, Iowa; Missouri Valley Constructors of Leavenworth, Kansas; and Donovan Construction Company of St. Paul Minnesota.

Mifflin Moves Its Mill To Cokerville Mine Site

Mifflin Mining Company is moving its flotation mill from its present site at the edge of Mifflin in Iowa County, Wisconsin, to the site of its Cokerville mine and jig mill about 3½ miles away. The new arrangement will place all milling operations under one roof at the mine site, and will embody several changes in its flowsheet.

First milling will be done on ore already on the surface—some mined ore which has been stockpiled, and some fines which were impossible to recover with insufficient equipment in the earlier operation.

Later milling will be done on ore from the Cokerville mine which is owned by New Jersey Zinc Company and leased by Mifflin. It is estimated that about 400,000 tons of ore remain in the mine, averaging five percent sulphide zinc with minor amounts of galena. It is planned to mine 250 tons daily to furnish a ball mill feed of six tons per hour.

There has been a recent change in the ownership of Mifflin. Herbert Turner of the Turner Construction Company of Boscobel, Wisconsin is now owner of Mifflin, and John Howland of the original partnership remains as manager of both mine and mill.

After almost 100 years of continuous operation, the *Rosiclare Lead and Fluorspar Mining Company* has closed down its mines and mills in Hardin County, Illinois. Officials want to review general affairs of the company and of the fluorspar industry before considering possible sale of its properties to an interested firm.

Paragould, Arkansas is the scene of a gold hunt being undertaken by Herb Lipps who believes that there is gold in the Madre Verda area. He has leased 1,000 acres and has started preliminary excavation work atop Madre Verda Mountain. He found gold in the bottom of a shallow pool, and is now making an effort to find the source of the gold-bearing sand.

Bell Telephone Laboratories has developed a new and extremely simple process for refining germanium and other materials to practically perfect purity—99.99999999 percent. The new method is already in use.

The General Services Administration has decided to place the Diamond magnesium plant at Painesville, Ohio in standby operation. The plant is one of six which GSA reactivated after World War II and then deactivated. The only one now in operation is the Dow magnesium plant at Velasco, Texas, which will continue in full production until June 30, 1954. During the fiscal year 1953, the Diamond plant produced 3,761,454 pounds of magnesium. The *H. K. Ferguson Company* will place the plant in standby condition.

Florida's state road department has refused permission for anyone to prospect for minerals along state roads. The board acted on a recommendation from its chief engineer who said that private groups would demand similar privileges, and in some cases private landowners who did not know that their lands contained valuable minerals might be taken advantage of. The general policy was adopted after *Kennecott Copper Corporation's* subsidiary, *Bear Creek Mining Company*, requested permission to drill for titanium-bearing sands.

The *Virginia Iron, Coal and Coke Company* of Roanoke, Virginia is reported to be operating a manganese mine in Tennessee, just south of Damascus, Virginia.

Despite the fact that United States zinc stocks are still increasing, *St. Joseph Lead Company* spokesmen report that there is no curtailment of zinc production at the *Balmat* operations in New York.

The United States Geological Survey has released maps showing radioactive anomalies detected along the Gulf of Mexico beach between Sanibel Island and Caladesi Island, and along the Atlantic Ocean beach between Cape Fear, North Carolina and Edisto Island, South Carolina. The anomalies represent areas of unusually high radioactivity as observed instrumentally from the air and may or may not indicate the presence of uranium or thorium. Also released by the U.S. G.S. was a report on airborne radioactivity surveys totalling 5,600 traverse miles in 10 areas in Florida that were thought to be geologically favorable for the occurrence of uraniferous deposits. Abnormal radioactivity was recorded in eight of the 10 areas; the anomalies were in Bradford, Clay, Columbia, DeSoto, Dixie, Lake, Marion, Orange, Sumter, Taylor, and Union counties.

Foote Mineral Company has tentatively approved further expansion of facilities for the production of lithium ores and chemicals. The proposed expansion, which has been under study for almost a year, will include major additions at the company's Kings Mountain, North Carolina and Sunbright, Virginia plants. Facilities at the Exton, Pennsylvania plant will be increased to a lesser extent. Many of the present facilities were designed and built with future expansion in mind.

Tennessee Copper Company has torn down its 325-foot smelter smokestack at Copperhill, Tennessee after more than 40 years of service. In its place a new acid plant No. 3 is rising. *Leonard Construction Company* of Chicago is the contractor.

The *Attapulgus Minerals and Chemicals Corporation* and the *Edgar Brothers* have agreed to merge as the *American Minerals & Chemicals Corporation*. The merger will be accomplished through an exchange of shares. The two firms will retain their identities and will be operated as separate divisions of the new company. Attapulgus is among the larger producers of fullers earth, while Edgar is one of the largest integrated producers of kaolin.

Charles K. Bain of Bonne Terre, Missouri has received a United States patent No. 2,667,750 for a method of sinking mine shafts. Mr. Bain's method provides for applying a concrete lining to the shaft walls as excavation proceeds, working from the top down, instead of excavating the shaft to the full depth and then applying the concrete lining from the bottom to the top.

Pickands Mather & Co. have recently let a contract to *Western Knapp Engineering Company* for the design and construction of a 500-long-ton-per-hour crushing, screening, washing, heavy media and DSM cyclone plant for the *Bennett* mine near Keewatin, Minnesota. Work on the plant is to begin at once with completion scheduled for May 15, 1955. This will be the fifth heavy media plant and fourth cyclone plant for Pickands Mather. The first heavy media plant went in operation at the *Biwabik* mine last year. Their first cyclone plant was put into operation at the West Hill plant at the beginning of this season.

Two new jig plants went into operation on the Mesabi Range this season. *W. S. Moore Company* added a jig section to its Prindle wash and heavy media plant utilizing Remer Jigs. *M. A. Hanna Company* completed the installation of a jig section at its *Carlz* mine. Hanna uses Yuba jigs.

M. A. Hanna Company's new *Yawkey* mine has started production. It is located about three miles north of Crosby, Minnesota. The company's washing plant at the *Buckeye* is in operation now, and also the new one at the *Maroco*. The *Cannon* mine, three miles southeast of Iron River, is almost completed. Mining operations are presently being conducted on a limited scale through the Bengal shaft which lies 1,600 feet from the new Cannon shaft. Construction of the surface buildings is about complete.

Cracked Mantle such as this can be repaired.

Same Mantle as above after crack has been repaired and then rebuilt with "MANGA-KOTE."

For quick and economical repair of worn equipment use "MANGA-KOTE" MANGANESE Nickel Steel Electrodes.

"MANGA-KOTE"

AC or DC Welding Electrodes

11½ to 13% Manganese Nickel Steel

It's New! Gives you all the advantages of tough, ductile manganese nickel steel weld deposits, yet runs as easily as mild steel electrodes.

It's Fast! Eliminates all the special techniques of application required in welding manganese nickel steel. Requires no Peening.

It's Versatile! Makes a perfect bond on all types manganese, carbon and nickel steels. Welds in all positions. Joins dissimilar metals. Welders — order MANGA-KOTE from your nearest distributor. Name on request.

RESISTO-LOY COMPANY

Grand Rapids 7, Michigan

An Unfailing Market for:

GOLD • SILVER • COPPER
LEAD • ZINC

Ores • Concentrates • Bullion
Precipitates • Furnace Products

FOR SCHEDULES, FREIGHT RATES, ETC., WRITE TO YOUR NEAREST OFFICE

AMERICAN SMELTING AND REFINING CO.

ASARCO

405 Montgomery Street, San Francisco 4, Calif.
700 Pacific Nat'l. Life Bldg., Salt Lake City, Utah
P. O. Box 1111, El Paso, Texas
Tacoma 1, Wash.
607 First National Bank Bldg., Denver 2, Colorado
810 Valley Bank Building, Tucson, Arizona
East Helena, Montana

Kennecott Mines Resume Regular Six-Day Week

Kennecott Copper Corporation's mines went back on a six-day work schedule in May after two months of operation on a five-day, 40-hour week. A marked improvement in demand for copper in the second quarter of the year made the longer working week possible. Operations in Utah, Arizona, Nevada, and New Mexico are affected by the new schedule.

The *Copper Cities Mining Company* expects to be in production some time in August, roughly five or six months ahead of schedule. Four of the seven units in copper concentrator are expected to start operating first, with the remaining three units being placed in operation within a few months. E. H. Westlake, president of *Miami Copper Company*, the parent organization, said that refined copper should be available in marketable form around December 1. See MINING WORLD, May 1954, pages 34 to 38, for construction details.

Work has started on construction of a hospital and administration building at the *San Manuel Copper Corporation's* new project at San Manuel, Arizona. These new buildings are scheduled to be completed by January 1955. *Del E. Webb Construction Company* is doing the work. Site preparation was handled by *Utah Construction Company* and *Stearns-Roger Manufacturing Company* as a joint venture.

A vanadium mineral previously unknown to science has been found at *Monument No. 2* mine in northeastern Arizona and named "Navajoite" in honor of the Navajo Indians on whose reservation the mine is located. Navajoite is a dark brown, fibrous mineral composed of hydrated vanadium oxide. Although it has a high vanadium content, it is not considered a good vanadium ore mineral because it does not occur in large enough quantity, according to the *United States Geological Survey*.

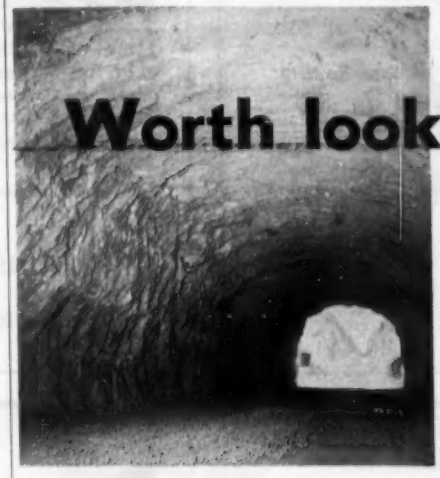
General Services Administration has leased additional warehouse space to provide storage for asbestos purchases in the Globe (Arizona) area. According to Frank Gowan, GSA manager for Arizona, the original warehouse at Globe is filled to capacity and the former freight house at Miami has been leased for future storage space.

Exploration work has been resumed at the *Cash* mine and plans call for some ore shipments in the near future. The mine is operated by E. R. Dickie of Bagdad, Arizona, and Jack Orr of Prescott. Mr. Orr is in direct charge of the work, employing four men.

The *Arizona Utah Mines Company* has been formed to take over and operate the *French Lilly* in the Black Canyon mining district of Yavapai County, Arizona, previously operated by the *Cedar Talisman Mines Company*. A small crew is employed in repairing the shaft and a limited amount of drifting on the 500-foot level of the mine is planned. The new group also proposes to do some custom milling. The mining and milling program is being directed by Charles H. Dunning, consulting engineer, of Phoenix; Joseph H. Morgan, attorney, is local representative for the operating group.

Inspiration Consolidated Copper Company, Inspiration, Arizona, reports that in 1953 the total ore production amounted to 3,917,915 tons with 909,483 tons mined by underground operations and 3,008,432 tons from the open pit. Total material moved in the open pit during 1953 was 12,818,782 tons, the stripping ratio being 3.26 to 1. The copper content of the ore mined was 1.022 percent. Total copper produced in 1953, including blister copper from leaching-in-place operations, amounted to 79,406,335 pounds, compared with 85,070,392 pounds produced in 1952.

A 10-year lease, with option to purchase, has been granted by the *Triumph Gold Mines, Inc.*, on its *White Chief* mine at Oatman, Arizona. The lessees are R. Sholto Douglas and John P. Farquahr of Los Angeles. The White Chief consists of six unpatented claims, 1½ miles southwest of Oatman. Development work includes a 1½-compartment shaft sunk to a depth of 200 feet with about 900 feet of drifting on the 100-foot and 200-foot levels. The lessees propose to repair the shaft and dewater the 200 level, then make a thorough geological survey of underground workings. Ore values are primarily gold with some silver.



Worth looking into . .

if you have a tunnel driving problem

Those lateral drill marks — left side of the picture — are the trace lines of a Boyles Bros. long-hole drilling operation . . . a mark of efficient tunneling. The excellent results are evident . . . a clean bore with neatly arched contour . . . uniform walls and back . . . all accomplished in record time with Boyles Bros. know-how and equipment.

Over 50 years of drilling experience have built Boyles Bros. reputation for completing jobs as per agreement. Consult us for any of these services.

DIAMOND DRILLING • TUNNEL DRIVING

CONTRACT MINING

DAM-SITE EXPLORATION and GROUTING

Boyles Bros. DRILLING COMPANY

5321 SOUTH MAIN STREET • DIAL 84-4401 • SALT LAKE CITY, UTAH

BRANCH OFFICES

Colville, Washington — Telephone 181

Leadville, Colorado — Telephone 526

AMERICAN ZINC, LEAD AND SMELTING COMPANY

Buyers of Zinc Concentrates Suitable for Smelting in Retort and Electrolytic Smelting Plants, also Buyers of High Grade Lead Concentrates.

Address Communications to Ore Buying Department

Paul Brown Building
ST. LOUIS, MISSOURI

423 Mills Bldg.
EL PASO, TEXAS

927 Old National Bank Building
SPOKANE, WASHINGTON

P.O. BOX 577
DUMAS, TEXAS

BUNKER HILL & SULLIVAN MINING AND CONCENTRATING CO.

Mines and Smelter at Kellogg, Idaho

Buyers of:

Lead ores and concentrates, zinc concentrates, silicious gold ores.

Sellers of:

"BUNKER HILL" brand of refined Pig Lead, Slab Zinc, Cadmium crude Antimonial Lead and Leaded Zinc Oxide.

We are proud of our "BUNKER HILL" trade mark. It represents the highest quality of metals produced. We likewise strive to make "BUNKER HILL" known as a symbol of the highest quality in our relations with our employees, with our suppliers of ores and concentrates, with our stockholders and with the general public.

For information regarding ore rates and shipments Address:

BUNKER HILL SMELTER
Box 29
Kellogg, Idaho

International Smelting and Refining Co.

ANACONDA

Buyers of

Copper, Silver & Gold Ores and Concentrates:

Address: Copper Smelter—Miami, Arizona
Ore Purchasing Department
International Smelting and Refining Co.
P. O. Box 1265
Miami, Arizona

Lead & Zinc Ores and Concentrates

Lead and Lead-Zinc Smelter
Lead-Zinc Concentrator
} Tooele, Utah

Address: Ore Purchasing Department

International Smelting and Refining Co.
819 Kearns Building
Salt Lake City, Utah

Please establish contact prior to shipment.

MAGMA COPPER COMPANY

Buyers of

COPPER, GOLD

AND SILVER ORES

MINES AND SMELTER AT

SUPERIOR, ARIZONA

Buckman Laboratories Inc. in Sonoma County, California, has closed its *Buckman* open-pit mercury mine and moved all equipment across the canyon where it will concentrate operations at the *Cloverdale* mine. Production is about 100 tons of mercury ore per day which is furnaced in the firm's rotary kiln. The metal is used principally in the company's chemical operations.

The *Siskon Corporation*, operating on the south fork of Dillon Creek in Siskiyou County, California, has stripped a section of hanging wall waste over a nearly horizontal part of its gold ore body and now has started a second open-pit bench to mine the stripped ore. The mill is operating at capacity and regular bullion shipments are being made. The firm has also started a deep-development adit at the Virginia-Tennessee ore body. Exploration is planned for the rest of the summer.

Idaho-Maryland Mines Corporation of Grass Valley, California, is turning its attention to tungsten and uranium. The company is presently negotiating with two different groups for uranium leases in the Moab district of Utah. The company's new tungsten mill at its Grass Valley property is in operation treating some high-grade ore that had been stockpiled. Tungsten concentrate will be shipped to San Francisco for purchase by the government. The firm now has about 100 men employed in both its gold and tungsten operations at Grass Valley. Exploration for gold in the 60-winze area is said to indicate a better grade of ore than found recently.

After a 17-year shutdown, the *Telegraph* gold mine near Downieville, California, is being reopened. Originally known as the *Shamrock and Buffalo*, the mine is now owned by Jack Sheedy who also acquired the *Wide Awake* and *Nessler* mines many years ago and consolidated them as the *Telegraph Mining Company*, Mr. Sheedy has a crew of six driving a new adit.

Utah Construction Company with head offices in San Francisco, California, has moved from No. 1 Montgomery Street to 100 Bush Street.

The *North Fork Mining Company* property at Forest, California, will be operated by the Cecil T. Vivians in conjunction with their development of their adjoining *Mugwump* mine. An agreement to this effect was made with D. D. Swauger of Los Angeles, trustee for the North Fork company. The Vivians report that their new tunnel at the Mugwump is in 500 feet and they hope to strike the gravel formation shortly.

The 165-acre diatomite deposit located in the Palos Verde Hills, 25 miles southwest of Los Angeles, California has been opened as an open-pit operation by the *Great Lakes Carbon Corporation*. Located in a residential area, the company's plans met with considerable public disapproval. However, a new type of pit operation will raise minimum dust, create little noise, and will be completely hidden from view by trees and shubbery. The crude ore will be trucked three miles to the Dicalite Division's plant at Walteria, California.

In the Downieville area of Sierra County, California reopening of some of the small gold mines has been underway with the return of good weather. At the *Brush Creek* mine four shifts per day have been at work retimbering the tunnel. Ed. J. Dorney has been doing assessment work at *Gold Point* mine. Virgil Church plans to let a contract for work at the *Irelan* mine which would include retimbering of 100 feet of tunnel.

1953 earnings of *Molybdenum Corporation of America* at its Mountain Pass, California rare earth operation showed only limited returns because earnings from this operation were curtailed during a considerable part of the year. This was caused by revamping of the mill and drought conditions. The capacity of the mill has been doubled and the company now is able to make a very high-grade concentrate with a good recovery.

Diamond drilling is being carried on at the *Walibu* quicksilver mine near Tehachapi, Kern County, California where the cinnabar occurs in a rhyolite dike which has been intruded along a fracture in the granite complex of the Sierra Nevada batholith. The work is being done under a $26,000 DMEA contract which calls for drilling of a series of core holes to penetrate the walls of the dike in an attempt to locate ore below the old workings.

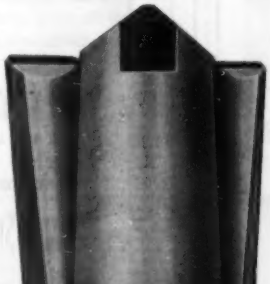
The old *Kentuck* gold mine, one mile north of Sierra City, California is being reopened by C. J. (Chick) Cicogni and Duane Holt of Grass Valley, together with H. R. Denni of Los Angeles. Most of the tunnel has been retimbered and the mill on the property is being placed in operation. Recent ore samples are considered promising.

LIDDICOAT

"used to destruction - no resharpening"

Liddicoat is the detachable bit that is "used to destruction" and then discarded. The strong connection . . . no threads . . . provides longer steel life and makes the changing of bits quick and easy. No delays, no resharpening, no extra costs.

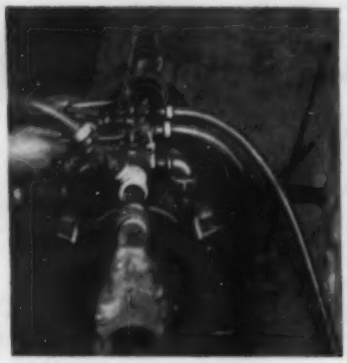
The new LIDDICOAT "TEE CEE" BIT



Where a Tungsten carbide bit is indicated the TEE CEE is designed for on-the-job interchange with the famed LIDDICOAT bit that is "used to destruction." The sockets of the Liddicoat TEE CEE and USED TO DESTRUCTION bits are accurate to thousandths of an inch, a degree of precision that means a stronger connection and longer bit life. Of prime importance is the strong attachment without threads. Forged within the socket of the bit are flats beween the rounds. Any turning of the rod within the bit sockets tends to tightly lock the bit to the rod, yet it is easily removed with a weighted knockoff block. TEE CEE and USED TO DESTRUCTION bits both fit the same drill steel. For full details, call on us or write.

WESTERN
Rock Bit Manufacturing Company
552 West 7th South • Salt Lake City 4, Utah

KA-MO DRILLS



FOR HARD ROCK MINING

KA-MO 8" diameter drills, used for "burn-cuts" in mining operations, produce unusual extra ore tonnage and greater advance per shot.

For further information concerning your particular problem, contact your nearest KA-MO distributor or write KA-MO Tools, Inc., Dept. WM754.

KA MO **KA-MO TOOLS, INC.**

EARTH BORING EQUIPMENT

1845 SOUTH 55th AVE. • CICERO 50, ILL.

COLUMBIAN ALL-METAL BUILDINGS

Strong • Fire-Safe • Low Upkeep

Columbian All-Metal Buildings are increasingly popular with the mining industry because of their unlimited utility value—for warehouses, engine houses, dryhouses, shops, garages, compressor houses, etc. Prefabricated from quality steel. Sectional construction assures easy, low-cost erection. Exceptionally weather-tight. Rigid, strong, fire-safe. Minimum upkeep. Order from distributors listed below—or write direct for complete information.

COLUMBIAN STEEL TANK CO.

P. O. Box 4048-H, Kansas City, Mo.

Distributors in the United States

Denver Equipment Company
1400 Seventeenth Street
Denver, Colorado

Elmco Corporation
34 South 4th West Street
Salt Lake City, Utah

Distributors—Foreign

Avenida Ejercito Nacional 458-D
Colonia Chapultepec Morales
Mexico, D. F.

Indair's Sparky answers the demand for ARGON ...the newest gas for inert-arc welding. ARGON is now a standard member on Indair's roster of industrial gases.

INDUSTRIAL AIR PRODUCTS CO.

PORTLAND, OREGON • SPOKANE, WASHINGTON
MEDFORD, OREGON • YAKIMA, WASHINGTON

PRIMACORD*

gives you:
SAFETY,
SIMPLICITY,
DURABILITY,
EFFECTIVENESS,
ADAPTABILITY.

All this, and you also get lowest overall costs. Insensitive to stray currents, easy to hook up and it's doubly safe, especially in presence of electrical storms. PRIMACORD will solve many of your blasting problems.

*Four Types Available: PLAIN, REINFORCED, WIREBOUND, PLASTIC.

PRIMACORD - BICKFORD
Hot Wire Fuse Lighters
Detonating Fuse
Safety Fuse
Celokap

COAST MANUFACTURING & SUPPLY COMPANY
ESTABLISHED 1867
LIVERMORE CAL.

Ask your powder supplier or write for literature

COAST MANUFACTURING & SUPPLY CO.
LIVERMORE, CALIFORNIA

Development of the *Linka* mine near Austin, Nevada, is moving ahead. Drifting on the 150-foot level, and extensive exploration and drilling on the 300-level have indicated a tungsten ore body of sufficient size to warrant purchase of a 200-ton mill. The mine was originally owned by Steve Linka who sold it to *C & C Tungsten Mining Corporation* of Reno, headed by Jay A. Carpenter. *California Tungsten Corporation* then took over the mine on a purchase option and *Uranium Mines of America* optioned it from California Tungsten. Both of the latter firms are headed by E. G. Frawley of Salt Lake City.

Continental Sulphur and Phosphate Corporation of Dallas, Texas has let a contract to the *American Sulphur and Refining Corporation* of Los Angeles to construct a sulphur refinery near Sulphur, Nevada. Capacity will be between 50 and 75 tons daily.

M. J. Williams who has a lease on a manganese property near Goldfield, Nevada owned by L. J. Smith reportedly expects to build a washing plant a few miles from Beatty to treat the ore.

The *Magnet Cove Company* of Houston, Texas, has leased a barite property 35 miles south of Battle Mountain, Nevada, which has been held for the last few years by George Dyer, W. G. Lee, Hand and Alvin Layton. The property is known as the *Greystone* group. Magnet Cove is operating a treatment plant at Beowawe and is now building a road from the plant to the property. The company also holds property near Beowawe which is already being worked.

A prospect adit has been driven by *Tungsten Mountain Mining Company* on a vein of scheelite ore for a length of 80 feet. Surface showings have indicated that the vein is about 260 feet, long, with an average width of five feet. A lower adit is being driven to develop the downward extension of the ore body. The property is in the Clan Alpine district of northeast Churchill County, Nevada.

A newly organized firm, *Platoria Uranium Corporation*, is developing a uranium deposit 70 miles northwest of Winnemucca, Nevada in the Kings River Valley of Humboldt County. It is reported that at the surface the vein was about 30 inches wide; at a depth of 50 feet, the depth of the present shaft, the vein widened to about four feet. Two carloads of ore have been shipped to the Salt Lake City mill of the Vitro Chemical Company and were said to have contained a higher percentage of uranium than most ore produced on the Colorado Plateau. The mine shaft will be sunk another 100 feet and then diamond drilling will be done in an attempt to determine the extent of the ore body. A. N.

Core Drilling
by Contract

Exploration for coal and other mineral deposits. Foundation test boring and grout hole drilling for bridges, dams and all heavy structures. ***Core Drill Contractors for more than 60 years.***

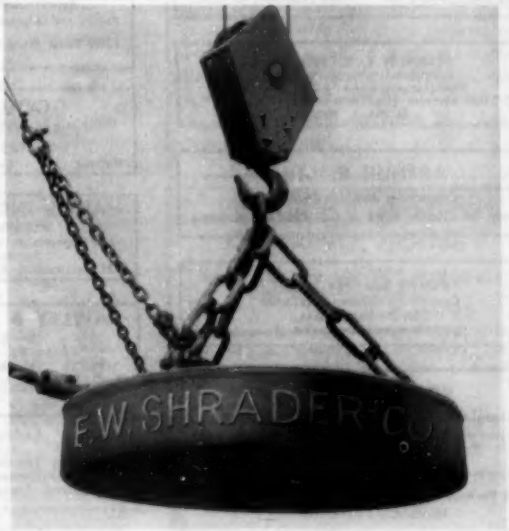
JOY MANUFACTURING CO.
Contract Core Drill Division • MICHIGAN CITY INDIANA

FEEDOWEIGHT

A self-contained conveyor feeder scale that feeds, weighs, totalizes and registers. Use the Feedoweight for better control of ball mill grinding. It accurately controls FEED by WEIGHT, automatically. Made in sizes to meet all tonnage requirements.

MERRICK SCALE MFG. CO.
172 Summer Street
PASSAIC NEW JERSEY

LIGHTEST LARGE MAGNETS



78" diameter Circular Electro Magnet for handling shredded cans and light bulky scrap at Yerington Mine, Weed Heights, Nevada, weighs only 8900 lbs.

Electro magnets and permanent magnet equipment for tramp iron removal, material handling, separation and purification.

For more information write to:
F. W. SHRADER CO.
Industrial Magnets
5788 Washington Blvd. Culver City, Calif.

CHANGE OF ADDRESS

CIRCULATION DEPARTMENT
MINING WORLD with which is combined the Mining Journal
121 Second St., San Francisco 5, Calif.

Please change the address of my Mining World subscription

NAME .....
OLD ADDRESS .....
NEW TITLE OF POSITION .....
NEW ADDRESS .....
NEW COMPANY CONNECTION .....

PROFESSIONAL DIRECTORY

One-Inch Card, $50 Yearly—½-Inch, $35 Yearly. Payable in Advance.

CONSULTING ENGINEERS:

C. P. KEEGEL
Mining & Metallurgical Engineer
Administration Appraisal
707 S. 6th St. Tel 571
Las Vegas, Nevada

Cables: KELLCON Lincoln 6-4100
JOHN E. KELLY
Consultant in Natural Resources
Washington Representation
Minerals Petroleum Timber Power Water
207 Capitol Towers, Washington 2, D.C.

ARNOLD H. MILLER
CONSULTING ENGINEER
General Mine, Mill and Industrial Appraisals, Plant Design, Mechanization.
Cable: "ALMIL" Tel. Cortland 7-0635
120 Broadway New York City 5, N. Y.

MURPHY, F. M.
Consulting Mining Geologist
1201 Maryland Parkway, Las Vegas, Nev.

RODGERS PEALE
Consulting Mining Geologist
315 Montgomery St. San Francisco 4, Calif.

FRANKLIN L. C. PRICE
Registered Mining Engineer
Examinations——Valuations
1105 Northern Life Tower—Tel. MAin 5134
Seattle 1, Wash.

ARTHUR R. STILL
Consulting Mining Geologist
Room 24, Union Block Prescott, Arizona

John Q. St. Clair
Consulting Mining Geologist
586 Buchanan Ave.
Norman, Oklahoma

MARVIN J. UDY
Inorganic Chemistry Electrochemistry
Electric Furnace Smelting
Process Metallurgy
Ferro-Alloys, Calcium Carbide, Phosphorus
546 Portage Road Telephone 2-6294
NIAGARA FALLS, N. Y.

MILL DESIGN & CONSTRUCTION
Send for Free Bulletin
O. W. WALVOORD CO.
401 High Street • Denver, Colorado

CLIFFORD R. WILFLEY
Mining Engineer
Consulting
2233 Grape St. EAst 0398
Denver 7, Colorado

CHEMISTS, SAMPLERS, SHIPPERS' REP'S:

ARIZ. TESTING LABORATORIES
CLAUDE E. McLEAN, REGISTERED ASSAYER
Analytical and Consulting Chemists
Box 1888 817 W. Madison St. Phoenix

B. W. DEASON V. E. WORSLEY
BLACK & DEASON
Assayers and Chemists
Ore Shippers Represented at all Smelters
P. O. Box #1888 Salt Lake City, Utah

THE COLORADO ASSAYING CO.
ASSAYERS, CHEMISTS, and SPECTROGRAPHERS
Est. 1900
Gold, Silver each $1, both $1:50, Copper 75c. Send for Free Copy of our Mineralogist's Pocket Reference Giving Detailed Information on All the Principal Ores.
2013 WELTON ST., DENVER 1, COLORADO

T. G. Deggendorfer
Shippers' Representative
Control Assays
Box 840 Kellogg, Idaho

DICKINSON LABORATORIES
Assayers—Chemists—Metallurgists—Umpires
Shippers Representatives at Local Smelters
Representatives at Mexican Border
Points for Shippers of Manganese and Fluorspar
1300 West Main Street El Paso, Texas

GOODALL BROTHERS
ASSAYERS AND CHEMISTS
SHIPPERS' REPRESENTATIVES
Helena Established 1909 Montana

HANKS, INC., ABBOT A.
ASSAYERS AND CHEMISTS
Supervision of Sampling at Smelters
Spectrographic Analysis
624 Sacramento St. San Francisco 11

HAWLEY & HAWLEY
W. E. HAWLEY, Mgr.
Assayers, Chemists, Ore Buyers
Shippers' Representative
P. O. Box 1060 Douglas, Arizona

Ledoux & Co. (Inc.)
Assayers Spectrographers Chemists
Shipping representatives at all seaports and refineries in the United States
359 Alfred Avenue Teaneck, N. J.

PETER MACK
Control and Umpire Assaying
Box 808 Wallace, Idaho

Wood Assaying Co., Henry E.
Established 1878
ASSAYERS and CHEMISTS
2042 Broadway Denver 2, Colorado

SMITH-EMERY COMPANY
Established 1910
Assayers—Chemists
Metallurgists
Spectrographers
Shippers' Representatives
781 East Washington Blvd., Los Angeles, Calif.
Member
American Council of Commercial Laboratories

PRODUCTS AND SUPPLIES:

VAN WATERS & ROGERS INC.
Flotation Chemicals, Mining Reagents
Largest and Most Complete Stocks in Northwest
Seattle, Spokane, Portland, Boise

SCANDINAVIAN ORE TANKERS, INC.
Public Ledger Bldg.
Philadelphia 6, Pa.
COMBINATION ORE and OIL CARRIERS.
MOST ECONOMICAL TRANSPORTATION AFLOAT. INQUIRIES INVITED

DRILLING COMPANIES:

R. S. McClintock Diamond Drill Company
Spokane, Washington—Globe, Arizona
Diamond Core Drill Contractors
Manufacturer of Diamond Bits and drilling accessories

DIAMOND DRILL
Contracting Company
S. 18 Stone Spokane 15, Wash.
"DIA-HARD" CORE
BARRELS
AND
DIAMOND DRILLING SUPPLIES
Core and Churn Drill Contractors

CONTINENTAL DRILLING COMPANY
523 West Sixth St., Los Angeles 14, Calif.
DIAMOND CORE DRILLING CONTRACTORS
Manufacturers of core bits and supplies

Sweet, Denver mining engineer, is president of the firm. Jack M. Anderson, *Anderson & Forester Screw Machine Products Company*, is vice president, and Irving Linder is secretary-treasurer.

Sloan and Kingaard of San Diego, California are diamond drilling on the *Searchlight* group of claims in White Pine County, Nevada. Preliminary surface assays have disclosed 0.30 to 3.7 percent WO_3. Samples were taken across a tactite zone betwen Paleozoic limestone and quartzite, and granite and quartz-monzonite. Headquarters for the operation are in Elko, with a base camp established at Joy in White Pine County.

A second shaft will be sunk by *Nevada Rawhide Mining Company* at its silver-lead property 30 miles south of Fallon, Nevada. The new shaft will be sunk to a depth of 200 feet to reach the horizon where three veins exposed on the surface are expected to intersect. Surface bulldozing disclosed a high-grade silver vein beneath the overburden. The No. 1 shaft, down more than 70 feet, is being operated by a lessee.

The recent formation of the *Nevada Mica Manufacturing Company* in the Las Vegas area of Nevada may possibly result in development of a new mica processing industry in southern Nevada. Incorporated for $1,000,000, the firm expects to be in operation processing and manufacturing finished mica products shortly.

Getchell Mine, Inc.'s tungsten mill at Getchell, Humboldt County, Nevada is now processing tungsten ore at the rate of 1,000 tons per day. This includes both the company's ore and custom ore.

A one-third interest in the *M & M* quicksilver mine, located in the Tybo district of Tonopah, Nevada, has been purchased by J. A. Hunt of San Diego and from Mrs. Lorena Peterson of Tonopah. Orville Stockman of El Cajon, California Equipment is being installed to undertake a vigorous development program. The other two-thirds interest in the mine is owned by John Connolly, Lee Hand, and the Louis Miller estate.

Tonopah Mining Company of Nevada and two Canadian firms—*Beaver Lodge Uranium Mines* and *Consolidated Ranwick Uranium Mines*—are reported to have formed a syndicate for the exploration of uranium in Arizona, Utah, and other western states. An option has been taken on about 30,000 acres in Arizona where initial airborne scintillometer work indicated considerable radioactivity. Claims in the Moab area of Utah have also been optioned.

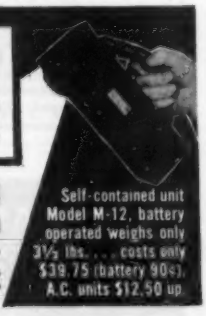
Mrs. Ada Hamilton is reported to have started milling operations on the *Thomas* tungsten claims, leased from Bill Thomas, in the Smokey Valley, Nevada.

E. E. Rudell and Truman Burbridge have discovered a vein with uranium mineralization in Gallina Canyon, Nevada. The find is reported to be 30 feet high and 100 feet wide, with depth unknown.

Uranium Metals, Inc. has been incorporated in Humboldt County, Nevada, by Morris Constant and Benjamin Constant of Reno; Herbert Henne, Ed R. Larson, and Theodore Barber, all of Winnemucca. The company has leased 500 acres in the Kings River district of Humboldt County and diamond drilling is already under way. The AEC is reported to have checked the area and indicated that uranium ore is present in the district. The firm also has claims in southern Oregon.

FUN AND PROFIT!

• Find Unusual Minerals...Hidden Wealth with Ultra-Violet Mineralight



Self-contained unit Model M-12, battery operated weighs only 3½ lbs. . . . costs only $39.75 (battery 90¢). A.C. units $12.50 up

Mineralight instantly locates and identifies scheelite, uranium, mercury, zirconium and other hard-to-find minerals . . . opens new, exciting, and interesting worlds of gorgeous colors. You'll find a reasonably-priced Mineralight unit invaluable whether you're prospecting seriously or as a hobby.

Ultra-Violet Mineralights are used by hobbyists and engineers the world over . . . for prospecting, ore-sorting, core analyses, mineral displays, industrial inspection, chemical analysis, and in laboratory techniques. Long-wave and short-wave units.

Write NOW for full information and name of nearest dealer.

ULTRA-VIOLET PRODUCTS, INC.
145 Pasadena Avenue, South Pasadena, California

NEW MEXICO

The *General Chemical Company* has closed its *Shrine* fluorspar mine near Tyrone, New Mexico because of the current low price for fluorspar. The company's mill near Deming will continue to operate from its stockpile.

Gib Thorp, Ed Barker, and Allen Barker have made a silver strike in the Black Range west of Truth or Consequences, New Mexico at Iron Creek. Two truck loads of ore are said to have been shipped to an El Paso, Texas Smelter. Size of the strike has not been disclosed.

J. L. Mercer of Corpus Christi, Texas has acquired a lease and option to purchase a group of seven mineral claims owned by Robert P. Thompson of Tyrone, New Mexico. The claims, in the Burro Mountain mining district, brought a price of $250,000. They are adjacent to the *Phelps Dodge Corporation's* property in this district. The lease is for five years with Mr. Thompson to receive 15 percent of net mill or smelter returns, with a minimum royalty fixed at $250 a month. Development of the property has already started.

Two firms are conducting uranium mining operations in the Hot Springs area of Sierra County, New Mexico. Newest group to enter the field is *Badget Mining Company* whose operations are near Caballo Dam. Robert H. LaFollette is president. The other company is *Sierra Uranium Company*.

THE MARKET PLACE

FOR SALE BY OWNER

8 Banks Flotation Cells
2 Hydroseparators 60" x 45'
1 100' Thickner
2 5' x 45' Calcine Coolers
1 22' x 48' Herreschoff 14 hearth Furnace
1 2" Mayne Pump
3" & 4" Bingham Slurry Pumps
1 6" Dorr Vertical Duplex Pump
1 6" Denver Simplex Diaphragm Pump
3 Sutorbilt Blowers 2000 CFM
4 Stearns Rogers Reagent Feeders
2 4 x 6 Allis Chalmers Screens S.D. Utah Type
2 Portable Compressors 210-315
16 Conditioner Tank Motorized Reducers 5 H.P.
3 Filters, Dorrco drum type 12' x 10' & 14' x 18'
2", 3" & 5" Mdl. C & K Wilfley Pumps

for further information contact
J. H. Clements in care of
BASIC REFRACTORIES, INC.
Maple Grove, Ohio

FOR SALE

PLACER DREDGE HULL AND SUPERSTRUCTURE

A standard type structural steel placer dredge hull and superstructure, in good condition, total weight approximately 855 tons, is available in California. The hull measures 165' x 68' x 11'-6". It is riveted but can be readily cut into shipping sections for reassembly. This hull and superstructure is available because its dredging has been completed and the machinery removed. It could be moved and used for mining purposes or gravel dredging at only a small part of the cost of equivalent new material. Details can be obtained by writing Yuba Manufacturing Company, 351 California Street, San Francisco 4, California.

BUSINESS MEN'S CLEARING HOUSE

601 MIDLAND SAVINGS BUILDING
DENVER, COLORADO

50 years of world-wide placement service for all classes of executive, engineering, operating, etc., mine and mill men

FILE YOUR APPLICATION WITH US

MINING WORLD

with which is combined
MINING JOURNAL
The Production Magazine of the Metal Mining Industry
Published at
SAN FRANCISCO, CALIFORNIA
$3.00 Per Year ..... 13 Issues
(Includes Mine Development and Directory Number)

THE MARKET PLACE

SELECT YOUR EQUIPMENT NEEDS FROM THE LARGE STOCK OF DEPENDABLE RECONDITIONED MACHINERY.

FLOTATION MACHINES
1—New Morse "Jetair" 6 cell #7
1—New Morse "Jetair" 2 cell #7
1—Fagregun Single cell
1—6 cell 18" Stearns-Roger
2—6 cell Denver "Sub A" #21

FILTERS
1—3' x 3' Drum Filter
2—4' x 3' Morse Drum Filters
1—6' 2-disc American Filter
1—6' 3-disc American Filter
1—18" Morse Round Pattern Filter Press
1—38" Merrill Triangular Filter Press
1—12# Sweetland Filter Press. 36 leaves

BALL & ROD MILLS
1—4' x 3' Marcy Ball Mill
1—4' x 3' Morse Ball Mill
1—4' x 4' Marcy Ball Mill
2—6" x 48" Hardinge Conical Ball Mills
1—8' x 22" Hardinge Conical Pebble Mill
1—3' x 5' Marcy Rod Mill
1—3' x 9' Ruth Rod Mill

COMPRESSORS
1—64 CFM Gardner-Denver, 4½" x 4"
2—80 CFM Ingersoll-Rand, 7" x 5"
1—121 CFM Gardner-Denver, 8" x 6"
1—173 CFM Chicago-Pneumatic, 9" x 8"
1—173 CFM Ingersoll-Rand, 9" x 8"
1—179 CFM Ingersoll-Rand, 12" x 10"
1—213 CFM Bleisdell, 14" & 9" x 8"
1—230 CFM Gardner-Denver, 8" & 4¼" x 5"
1—447 CFM Ingersoll-Rand, 14" & 7½" x 12"
1—637 CFM Sullivan, 14" & 8¼" x 10"
1—698 CFM Union, 18" x 13"
1—800 CFM Ingersoll-Rand, 18" & 11" x 16"
1—840 CFM Laidlaw, 13" x 10"
1—1418 CFM Ingersoll-Rand, 24" & 13" x 16"
1—230 CFM Gardner-Denver Model WBQ, driven by Buda 6 cylinder Gasoline engine, Skid mounted

LOCOMOTIVES
1—2-2½ ton Whitcomb Battery, 24" gauge
1—2½ ton Jeffrey battery or trolley, 36" gauge
1—3½ ton Mancha battery, 24" gauge, with 2 sets Edison batteries and charging set
1—4 ton Ironton battery, 36" gauge
2—7 ton General Electric permissible battery, 36" gauge
1—7 ton Atlas battery, 36" gauge
3—8 ton Ironton battery, 36" gauge
2—8 ton General Electric battery, 36" gauge
4—10 ton Atlas battery, 36" gauge
1—3 ton Whitcomb gas engine driven, 24" gauge
1—4½ ton Goodman trolley, 36" gauge
1—5 ton Jeffrey trolley, 36" gauge
1—6 ton Goodman trolley, 36" gauge
2—8 ton Goodman trolley, 36" gauge

TUGGERS AND SLUSHERS
1—Ingersoll Rand, model 6HC Single Drum Air Tugger
1—5 H.P. Brownie, Single Drum Electric Tugger
1—5 H.P. Sullivan Single Drum Electric Tugger
1—7½ H.P. Sullivan Double Drum Electric Slusher
2—10 H.P. Sullivan Three-Drum Electric Slushers
2—6½ H.P. Sullivan Single Drum DC Electric Tuggers
5—6½ H.P. Sullivan Double Drum DC Electric Slushers
1—10 H.P. Sullivan Two Drum driven by Continental 4 Cyl. Gas Engine.

THICKENERS & CONDITIONERS
1—24' diameter Dorr Lowhead Thickener
2—10' diameter Morse Bros. Thickeners
1—4' x 4' New Morse Conditioner

CRUSHERS
4—2-¼" x 3-½" New Morse Lab Jaw Crushers
5—4" x 6" New Morse Lab Jaw Crushers
1—9" x 15" Wheeling Jaw Crusher
1—9" x 15" Farrell Jaw Crusher
1—8" x 24" Rogers Jaw Crusher
1—8" x 36" Universal Jaw Crusher
1—11" x 18" Universal Jaw Crusher
1—24" x 13" Farrell Jaw Crusher
1—10" x 16" Hercules Jaw Crusher
1—10" x 16" Universal #3M Jaw Crusher
1—20" x 30" Austin-Western Jaw Crusher
1—36" x 48" Jeffrey Flextooth Crusher
1—26" x 18" Williams Hammermill
1—30" x 17" Williams Hammermill

VIBRATING SCREENS
1—24" x 36" New Universal Single Deck
3—3' x 5' Tyler "Hummer" Single Deck
1—42" x 72" New Universal Single Deck
1—42" x 72" New Universal Single Deck
1—42" x 72" Jeffrey-Traylor Single Deck
1—42" x 88" Jeffrey-Traylor Single Deck
1—3' x 8' Simplicity 3 deck
1—4' x 12' Symons Double Deck
1—4' x 12' Tyler "Ty-Rock" 3 Deck

FEEDERS
1—10" x 36" Jeffrey Type 2A Vibrating Feeder
1—36" x 36" Jeffrey #4 Vibrating Feeder
1—30" x 42" Type FO Vibrating Feeder Jeffrey
1—3' x 5' Hardinge Volumetric Belt Feeder
1—12" x 6' New Morse "Vari-Strokes" Ore Feeder
2—12" New Morse Wet Reagent Feeders
1—New Morse Cone Type Dry Reagent Feeder

Serving the World's Mining Regions since 1898.

MORSE BROS. MACHINERY COMPANY

2900 Brighton Blvd. **Denver 1, Colorado**

MOTOR GENERATORS
1—600 KW GE Syn. 275 V. 900 RPM
2—300 KW GE Syn. 275 V. 1200 RPM
1—200 KW GE Syn. 275 V. 1200 RPM
2—150 KW GE Syn. 275 V. 1200 RPM

ROTARY CONVERTERS
2—500 KW GE HCC 275 V. 1200 RPM
1—300 KW GE HCC 275 V. 1200 RPM
1—300 KW WEST. 275 V. 1200 RPM
1—200 KW GE HCC 275 V. 1200 RPM
1—150 KW GE HCC 275 V. 1200 RPM

LOCOMOTIVES
1—8 T WEST. 250 V. ML-925-LK 28½-24" Ga.
4—6 T WEST. 250 V. ML905-C 30-24" Ga.
1—5 T WEST. 250 V. ML-903-C 42-22" Ga.
1—4 T WEST. 250 V. ML-901-C 36-18" Ga.

WALLACE E. KIRK COMPANY
Grant Building (MW) Pittsburgh 19, Penna.

DIAMOND DRILLS

For a quick sale for the balance of my diamond drills and equipment, further price reductions to under 1/3 of replacement cost on drills and pumps and ¼ of cost on small parts and accessories, rods, casing etc. 2500 ft. of 1" black pipe @ 10¢ per foot. New 1953 Willys 4. W.D. pickup, used 1946 International 1½ ton flatbed with 550 gal. water tank. Write for further information. J. L. Havlick, Liquidating Trustee for Havlick Diamond Drilling Co., Inc., 2703 No. Pittsburg Street, Spokane 26, Wash. Phone Glenwood 7402.

QUICKSILVER FURNACE PLANT

2½ by 30 ft. rotary kiln, rated capacity 20 ton per 24 hr. complete with seals, supports, drive, fan, condensers, feeder, and 15 inch jaw crusher, all for $4,000.00 cash f.o.b., location, good road, 16 miles from Cloverdale, Calif. Write Buckman Laboratories, Inc., Geyser Road, Cloverdale, Calif.

We Cordially Invite Your Inquiry
regarding our present availability to sell your metal and mineral ore productions

COSMOPOLITAN SALES COMPANY
Selling Agents
Suite 1003M, 480 Seventh Ave., New York 1, N.Y.
Chickering 4-1739-40

SINTERING MACHINE
Repair and Replacement Parts
PALLETS — WHEELS — AXLES — DRIVE COMPONENTS — FAN IMPELLERS — PUG MILL SHAFTS AND PADDLES
SINTERING MACHINERY CORPORATION
156 Sinter Ave., Netcong, New Jersey

FEDERAL PIPE & TANK CO.
—WOOD PIPE and WOOD TANKS—
Factory and Main Office
6851 E. Marginal Way
Seattle 8, Wash.

FOR SALE: Gold and silver indicators sold on money back guarantee. Small—can be carried in your pocket. For information, write P. O. Box 2, Brockton 69, Massachusetts, U.S.A.

TUNGSTEN—domestic concentrates, middling, or ore cobbings of scheelite, huebnerite, ferberite, or wolframite wanted for purchase or custom treatment. Write Mineral Recovery and Engineering Company, P.O. Box 610, Osburn, Idaho.

2 EIMCO 21 TUNNEL SHOVELS
2 EIMCO 401 AIR LOCOMOTIVES
4 INGERSOLL RAND DB-3 DRIFTERS
2500 FT. 25 LB. 30 IN. GA. TRACK
1-4 DRIFTER JUMBO CAR
2-TM-8 COPPERS ELEC. VENT AIR BLOWERS
STANHOPE, 60 E. 42nd St., N. Y. 17, N. Y.

THE MARKET PLACE

SEALED BID SALE

LIVENGOOD PLACERS, INC.

Gold Dredging Real and Personal Property

Livengood, Alaska

Property consists of 212 owned and partially owned mining claims and 45 mining claims under lease, covering a gold-bearing placer deposit of approximately 3,800 acres, located on Livengood Creek, a tributary of the Tolovana River, in the Tolovana Mining District, 80 miles northwest of Fairbanks, Alaska, together with all buildings, structures, works, tools, machinery, equipment, stores, supplies, furniture, fixtures, improvements, waters, water rights and courses, easements, rights of way or user, mineral rights and claims and contract rights.

Property was formerly operated by the Callahan-Zinc Lead Company and includes an earth fill dam and water storage reservoir, water supply diversion tunnel and ditches; warehouse and office building, two story bunk house and mess hall, manager's house, machine shop and storage building and small office and machine shop at the dam site; complete electric power and light facilities, fuel oil storage facilities and water supply and sanitation facilities.

The dredge is a well designed diesel electric Yuba #145 six (6) cubic foot continuous line bucket type with 150 HP main drive motor, is fully equipped including a Caterpillar 44-20 auxiliary light plant. Complete stripping, thawing, dredging and incidental operating equipment, including shovels, tractors, compressors, motors, shop equipment, field and office engineering equipment, office furniture and fixtures and a complete warehouse inventory of operating and commissary supplies.

Property is reached from Fairbanks over a surfaced road which is usually free of drifts and open to travel from May to October. Dunbar, a station on the Alaska Railroad, about 40 miles from Fairbanks, is connected by a winter road over the marshes, 60 miles in length, which is used for heavy hauling when the ground is frozen.

All bids must be submitted on RFC bid form, which particularly describes the property, states in full the terms and conditions of the sale and sets forth instructions to bidders.

All bids must be submitted in special sealed envelopes which, together with the bid forms, will be supplied upon application made to the Reconstruction Finance Corporation at the address shown below.

All bids must be delivered to Reconstruction Finance Corporation at the address shown below not later than 2:00 P.M. on June 22, 1954.

Reconstruction Finance Corporation has a sixty day waiting period in which to advise bidders of acceptance or rejection of bids and reserves the right to reject any and all bids.

Apply for bid forms, envelopes and information to—

Reconstruction Finance Corporation
Portland Regional Loan Agency
444 Pittock Block, Portland 5, Oregon
Telephone: ATwater 6401

GRINDING MILLS

HARDINGE CONICAL MILLS: 5′ x 36″, 6′ x 22″
10′ x 36″, 10′ x 48″
ROD MILLS: 3′ x 10′, 6′ x 12′, 5′ x 10′, 5′ x 14′
CYLINDRICAL BALL: 3′ x 7′, 5′ x 4′, 6′ x 4′
5′ x 14′, 5′ x 18′, 7′ x 6′
6′ x 7′, 6′ x 12′, 8′ x 11′

CLASSIFIERS & THICKENERS

3—DORR THICKENER A—26′ DIA. x 10′ DEEP
2—DORR TURRET BOWL—3′ x 24′10″ x 10″
SPIRALS: 48″ x 19′, 54″ x 23′, 54″ x 30′,
60″ x 27′9″, 66″ x 42′, 60″ x 27′9″,
78″ x 28′ & 78″ x 32′.

AIR COMPRESSORS—ELECTRIC

3800′ & 3040′ INGERSOLL RAND 2300 V.
3074′ CHGO. PNEU. OCE 2300 V.
1884′ CHGO. PNEU. OCE 2300 V.
428′ & 676′ WORTHINGTON DUPLEX BELTED

DARIEN, 60 E. 42nd St., N. Y. 17, N. Y.

SOAP FLOTATION REAGENT

Pat. applied for.

Concentration of tungsten minerals, Fluorspar etc.

JOSEPH T. TERRY
Mineral dressing consultant
4218 N. Ivar Avenue, Rosemead, Calif.
Phone Atlantic 6-0117.

BARGAINS

1—16″ Superior McCulley Crusher with complete set of spare parts. Like new.
1—Champion Jaw Crusher.
1—42″ x 42″ Magnetic Cobber (Dings).
1—12′ x 6′ Oliver Filter complete with spare parts.
1—180 Rotary Vacuum Pump.
1—Bucket Elevator complete with spare belts and parts.
6—Hummer Screens complete with spare parts.
1—Railroad Type Motor Car.
1—Air Conditioning Unit.
1—2263 Gal. Fresh Water Tank.
2—Synchronous Converters.
1—Ingersoll Rand Bit Quenching Machine.
1—Ingersoll Rand J.M.B. Jackmill, complete.
1—Ingersoll Rand "J.F." Jack Furnace.
1—Ingersoll Rand Automatic Bit Grinder—Direct Motor Driven with many new grinding wheels.
6—Ingersoll Rand Jack Hammers.
2—Ingersoll Rand Busters.
2—Ingersoll Rand Drifters.
2—Worthington Air Pumps.
1—500 Amp. Westinghouse A.C. Welder.
150—Mine Dry Baskets complete with Accessories.
1250—New 5″ Steel Balls for Ball Mill.
4—103″ Dia. Head Frame Pulleys, complete with bearings.
We also have a large assortment of gear reducers, electric hoists, water pumps, compressors, new and rebuilt electric motors of all voltages and hundreds of other items.

RUDERMAN MACHINERY EXCHANGE
GOUVERNEUR, NEW YORK
Telephone 333-334

Market Place Advertising

360 inches	$5.50
180 inches	$6.00
90 inches	$6.50
45 inches	$7.00
Less than 45 inches	$7.50

Contract rates based on local number of column inches used within one year.
30 column inches equal one page.
Closing date: 1st of month preceding publication.
(Used and reconditioned equipment, liquidations, property sales only)
For additional 10,000 WORLD MINING export distribution: Add 50%

ALLISON STEEL MANUFACTURING COMPANY

Mine and Mill Buildings • Mine Rails • Ore Cars • Steel Gallows Frames • Ball Mills • Muck Plates • Crucible Drill Steel

---

We offer a complete repair service to the Mining Industry. Our new Machine Shop is equipped to handle your work quickly and economically.

Hot Milling of All Types of Detachable Bits

SOUTH 19TH AVENUE
PHOENIX ARIZONA
PHONE ALpine 8-7731

MACHINERY

Ball Mill: 7x5 Marcy with GE 440-v slipring motor, etc.
Ball Mill: 5x5 Marcy
Mucker: Eimco 12-B; 18″ ga.
Mancha Little Trammer; 18″ ga.

Paul F. Smith
39 W. Adams St. Phoenix, Ariz.

STEEL PIPE VALVES - FITTINGS

1/8″ to 36″ Diameter
20′ & 40′ Lengths

SEAMLESS • WELDED
STAINLESS
LIGHT GAUGE SPIRAL WELD

also

Reconditioned, guaranteed Quality pipe, economy priced

Every length of reconditioned pipe is clean, straight, rethreaded, tested to 350 lbs. water pressure and dipped in tasteless hot ashphaltum for greater protection . . . longer life.

Complete Fabricating Facilities
If it can be made of pipe We Can Make It
Send specifications for prompt estimate

PACIFIC PIPE COMPANY
407 Folsom St., San Francisco 5

INDEX OF ADVERTISERS IN MINING WORLD

Agenco Miniere & Maritime 87
Allis-Chalmers Mfg. Co., General Machinery Div. 8
Allis-Chalmers Mfg. Co., Tractor Div. 26, 36, 37
Allison Steel Mfg. Co. 107
American Cyanamid Co. 84
American Manganese Steel Div. 29
American Smelting & Refining Co. 98
American Zinc, Lead & Smelting Co. 100
Anaconda Copper Mining Co. 40
Arizona Testing Laboratories 104

Baldwin-Lima-Hamilton Corp. 12, 13
Basic Refractories 105
Bemis Bro. Bag. Co. 86
Bethlehem Pacific Coast Steel Corp. 27
Black & Deason 104
Boyles Bros. Drilling Co. ... 99
Buckman Laboratory 106
Bunker Hill & Sullivan Mng. & Concentrating Co. 100
Business Men's Clearing House 105

Caterpillar Tractor Co. ... 1, 42
Chemical Construction Co. .. 38
Coast Mfg. Co. 102
Colorado Assaying Co. 124
Colorado Fuel & Iron Corp. 34
Columbian Steel Tank Co. .. 102
Consolidated Pneumatic Tool Co. ..... WM 6 (World Mining Only)
Cosmopolitan Sales Co. 106
Cummins Engine Co. 30, 31

Darion Corp. 107
Dart Truck Co. 2
Deister Concentrator Co. 87
Deister Machine Co. ... 85, 87
Denver Equipment Co. 18
Diamond Drill Contracting Co. 104
Dickinson Laboratories 104
Dings Magnetic Separator Co. 6
Dominion Rubber Co., Ltd. WM 76 (World Mining Only)
Dorr Co. 9
Ducon Co. 72
Dulion Steel Co. 80
Dwight-Lloyd, Inc. 87

Edwards Co., E. H. 79
Eimco Corp. Outside Front Cover, 81
Engineers Syndicate, Ltd. .. 90
Euclid Div., General Motors Corp. 22

Federal Pipe & Tank Co. .. 105

Gallagher Co. 7
Gardner-Denver Co. 11
General Electric Co., International ..... WM 26 (World Mining Only)
General Motors Overseas Corp. ..... WM 28 (World Mining Only)
Godsy & Co., Inc., E. A... 85
Goodall Brothers 104
Goodman Mfg. Co. .... WM 21 (World Mining Only)
Gregg Car Co. ..... WM 27 (World Mining Only)

Hanks, Inc., Abbot A. 104
Hardinge Co. 78
Harnischfeger Corp. 24
Havlick Diamond Drill Co. .. 106
Hawley & Hawley 104
Heyl & Patterson, Inc. 28
Hough Co., Frank G. 32

Industrial Air Products Co. .. 102
International Combustion, Ltd. WM 79 (World Mining Only)
International Harvester Co. . 15
International Smelting & Refining Co. 100
Isbell Construction Co. 23

Johnson, Herbert Banks 87
Joy Mfg. Co. 4, 5, 103

Ka-Mo Tools, Inc. 102
Keegal, C. P. 104
Kelly, John E. 104
Kirk Co., Wallace E. 106

Ledoux & Co. 104
Lundberg Explorations, Ltd. . 87

MacNeil Co., J. A. 19
Mack, Peter 104
Magma Copper Co. 100
McClintock, R. S. 104
Meissner Engineers, Inc., John F. 87
Merrick Scale Mfg. Co. 103
Miller Machinery Co. 104
Miller, Arnold H. 104
Mine & Smelter Supply Co. . 14
Mineral Recovery 106
Morse Bros. Machinery Co. . 106
Murphy, F. M. 104

Nacional Minera ..... WM 80 (World Mining Only)
Naylor Pipe Co. 92
Nordberg Mfg. Co. Inside Back Cover

Pacific Foundry Co., Ltd. ... 84
Pacific Pipe Co. 107
Poole, Rodgers 104
Pioneer Engineering Works .. 10
Precision Radiation Instruments 94
Price, Franklin L. C. 104

Reconstruction Finance Corp. 107
Republic Supply Co. 70
Resisto-Loy Co. 98
Ruderman Machinery Co. .. 107

Sanford Day Iron Works ... 35
Sauerman Bros., Inc. 85
Scandinavian Ore Tankers, Inc. 104
Shrader Co., F. W. 103
Simplex Wire & Cable Co. 39
Sintering Machinery Co. 106, 76
Smith, Paul F. 107
Smith-Emery Co. 104
St. Clair, John Q. 104
Stanhope Co. 106
Stearns-Roger Mfg. Co. 93
Still, Arthur R. 104
Steody Co. 74
Sturtevant Mill Co. .... WM 25 (World Mining Only)
Syntron Co. 94, 80

Tampella Engineering Works 16
Taylor Wharton Iron & Steel Co. 96
Terry, Joseph 107
Timken Roller Bearing Co. 33
Traylor Engineering & Mfg. Co. ..... Inside Front Cover
Tyler Co., W. S. 76

Udy, Marvin J. 104
Ultra Violet Products Co. 105
Union Oil Co. 25

Van Waters & Rodgers, Inc. 104

Walvoord Co., O. W. 104
Wedge Wire Corp. 90
Western Machinery Co. 17
Western Precipitation Co. .. 20
Western Rock Bit Mfg. Co. 101
Wheel Truing Tool Co. 21
Wilfley & Sons, A. R. Outside Back Cover
Wilfley, Clifford R. 104
Winter Weiss Co. 82
Wolf, Harry J. 87
Wood Assaying Co., Henry E. 104

Yuba Manufacturing Co. .. 105

MINE ACCOUNTANT, expert cost-keeper, single, 25 years experience. Desires position in any Spanish American country (except Mexico). For full particulars please apply to Box P-4, Mining World, 121 Second Street, San Francisco, California.

WANTED: Partner in mining lease. Copper and Gold. Carbonate ore body is fifty feet wide. Should widen and get richer with depth. Possibility of making $5000 per month or more. Requires $7500. Reply Box P-1, Mining World, 121 Second Street, San Francisco, California.

TUNGSTEN-GOLD PROPERTY for sale or lease by owner. Extremely mineralized section, five veins, 400 foot vertical shaft (needs retimbering). Easy terms, H. G. Graves, Box 25, Redding, California.

FOR SALE: Big Injun Quicksilver Mine, located in Lake County, California. For details contact Alice H. Fisher, Box 133, Calistoga, California.

OPTION, LEASE OR SALE: 14 unpatented mineral claims, gold, silver, copper and lead on creek and mine-to-market road. In famous old Monte Cristo mining district. Katherine Knowlton, Rt. 2, Box 2084, Edmonds, Washington.

FOR SALE

Mining property now idle, located in Mt. Sneffels district, Ouray, Colorado consisting of 11 patented lode claims and three patented mill sites. For further particulars write Box P-2, Mining World, 121 Second Street, San Francisco, California.

FOR SALE: Bond or least cinnabar properties. Both have produced mercury. Price right. Alfred Pangborn, Box 48, Battle Mountain, Nevada.

MACHINERY FOR SALE: Nordberg double drum hoist with 300 h.p. Motor, 2000 ft. 1⅛" cable, two double deck cages, panels, switches, oil pump and controls. Three compartment headframe with sheaves and steel frame for handling, cages, bailers, etc. Address Box P-3, Mining World, 121 Second Street, San Francisco, California.

FOR SALE

Montana placer mine — operated from 1870's to 1940. Ancient channel on claims for 4,000 feet, 50 to 60 deep and 50 to 150 feet wide. Will cost at least $100,000 to establish operation. In 1938 one-half interest sold for $25,000. Owner will now sell for $50,000. Terms: One-third cash, balance at 5 percent interest payable from 15 percent of cleanup. Contact J. A. McKibbin, P.O. Box 1016, Olympia, Washington.

WANTED: Consistent supply of natural gold in its native state free of earth and rock, in units of sufficient quantity to assay minimum of 100 troy ounces fine gold content per unit.
Must furnish certified assay and analysis with each unit, or be willing to accept my assay and analysis reports. State price in terms of fine gold content basis, delivered. Nat Stone, 7528 Colfax Avenue, Chicago 49, Illinois.

DIAMOND BIT SALESMAN

For complete line diamond drill bits and reaming shells. Man with active accounts, some knowledge in diamond drilling preferred. Commissions. State territory and experience.

Anton Smit & Company, Inc.
333 W. 52nd Street New York 19, New York

CLASSIFIED SECTION

8 pt. type 12c per word. 10 pt. type 18c per word. Minimum charge $4.50.

(For Box numbers addressed to Mining World, add 50c)

Boxed ads (display) in either Market Place or Classified Sections—$7.50 per column inch.

(See Market Place Section for lower contract rates).

Closing Date: If proof required, 1st of preceding month, otherwise 10th.

FOR LEASE

Mercury mine, largest producer in Texas during World War II. Address H. S. Smith, 2920 Main Street, Joplin, Missouri.

...ANACONDA
...COPPER
...and SYMONS® CONE CRUSHERS

• Synonymous with good crushing practice—unexcelled in their field—Symons Cone Crushers again are the choice of Anaconda Copper Company. For the Weed Heights (Yerington) Nevada project, as throughout Anaconda's far-flung operations, and throughout the entire Copper Industry, the new and repeat orders for Symons Cone Crushers are continued evidence of the satisfaction given in fine reduction crushing service. The outstanding performance of Symons Cones in delivering a finely crushed product in greater capacities and at lower cost makes them the leading choice of the world's outstanding mining companies.

Following is a partial list of some of the Symons Cone Crusher users in the copper industry:

Anaconda Copper Mining Co.–U.S.A.
American Smelting & Refining Co.–U.S.A.
Atlas Consolidated Mining & Development Co.–Philippines
Bancroft Mines–Africa
Braden Copper Co.–Chile
Britannia Mining & Smelting Co.–Canada
Campbell Chibougamau Mines, Ltd.–Canada
Chile Exploration Co.–Chile
Copper Range Co.–U.S.A.
Calumet & Hecla Consolidated Copper Co.–U.S.A.
Gaspe Copper Mines, Ltd.–Canada
Granby Consolidated Mining Smelting & Power–Canada
Howe Sound Co.–U.S.A.
Hudson Bay Mining & Smelting Co., Ltd.–Canada
Inspiration Consolidated Copper Co.–U.S.A.
Kennecott Copper Corp.–U.S.A.
Lorelei Copper Mines, Ltd.–Africa
Magna Copper Co.–U.S.A.
Messina Transvaal Development Co., Ltd.–Africa
Miami Copper Co.–U.S.A.
Mount Lyell Mining & Railway Co., Ltd.–Australia
Mufulira Copper Mines, Ltd.–Africa
Nchanga Consolidated Copper Mines, Ltd.–Africa
Nevada Consolidated Copper Co.–U.S.A.
Noranda Mines, Ltd.–Canada
Normetal Mining Corp., Ltd.–Canada
Phelps Dodge Corp.–U.S.A.
Roan Antelope Copper Mines, Ltd.–Africa
Rhokana Corporation, Ltd.–Africa
San Manuel Copper Corp.–U.S.A.
Shattuck Denn Mining Corp.–U.S.A.
Sherritt Gordon Mines, Ltd.–Canada
Tennessee Copper Co.–U.S.A.
Tharsis Sulphur & Copper Co., Ltd.–Spain
Tsumeb Corporation Ltd.–Africa
Turk Maadin Sti.–Turkey
Union Miniere du Haut-Katanga–Africa
Uruwira Minerals Ltd.–Africa
Utah Copper Co.–U.S.A.
United Paracale Mining Co.–Philippines
Waite Amulet Mines, Ltd.–Canada
White Pine Copper Co.–U.S.A.

Built in both "standard" and "short head" types, Symons Cone Crushers are unsurpassed for quantity production of all types of ores and industrial minerals.

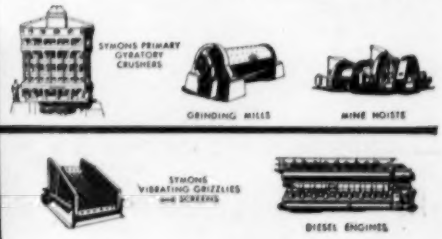
Other Nordberg machinery for the mining industry includes Primary Gyratory Crushers, Vibrating Grizzlies and Screens, Grinding Mills, Mine Hoists, and Diesel, Duafuel® and Spark-Ignition Gas Engines.

Write for further details on the machinery you need.

NORDBERG MFG. CO., Milwaukee, Wisconsin

C354

SYMONS...A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD



NORDBERG
MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS
NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON
TORONTO • MEXICO, D.F. • LONDON • JOHANNESBURG

WILFLEY PUMPS

A Vital Factor in Production Continuity

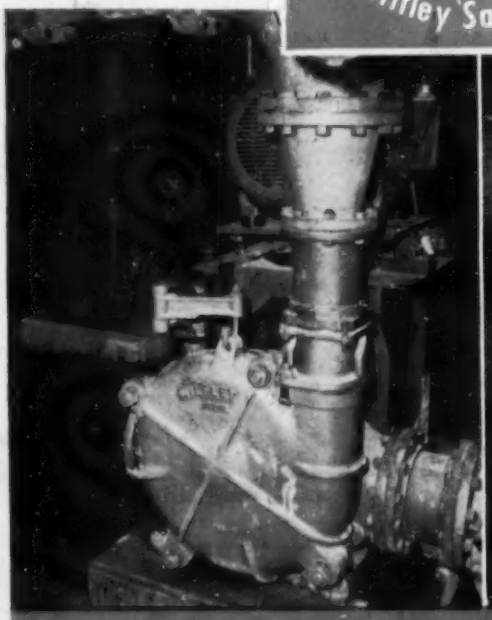
WILFLEY'S remarkable success-record in solving a great variety of pumping problems is well known to operators of mills and chemical plants all over the world. It is a record born of engineering "know-how" plus many years of experience in keeping pace with the changing requirements of modern industry.

- *Individual engineering on every application*
- *Cost-saving efficiency*
- *Reduced power and maintenance costs*
- *Continuous operation without attention*
- *Minimum replacement of parts*
- *Designed for simple installation*
- *Economical pump size for every requirement*

Write or wire for complete details.

Wilfley Acid Pump
"COMPANIONS IN ECONOMICAL OPERATION"
Wilfley Sand Pump

Typical Wilfley installations are shown below. Rubber lining and stainless steel are some of the materials used in Wilfley Sand Pumps and Acid Pumps to provide maximum pumping efficiency.



A. R. WILFLEY & SONS, Inc. • Denver, Colorado, U.S.A. • New York Office: 1775 Broadway, New York City